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MARKET INFORMATION AND MARKET MONITORING

Preliminary study on needs and prospects
for the development of external, computer-based
marketing information systems for the Norwegian fishing industry.

By

Rune Lines

FTFI Report No. A 41.

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ABSTRACT.

The report discusses the needs and conditions for use, and also sources of information on market conditions for the Norwegian fishing industry *). On the basis of this information,an outline of a proposed external marketing information system is given. It is suggested that the information be divided into three major parts: A resource information part, a market information part and a database part. There are already at least ten marketing information systems in existence for fish and fish products. The advantage of a Norwegian system is that it can be adapted to Norwegian conditions and requirements.

3 Key Words
Marketing information system
Need
Opportunities, limitations.

*) The author uses the terms "norsk fiskerinæring" (The Norwegian Fishing Industry), "fisk og fiskeprodukter" (fish and fish products) etc. which should really be translated as the seafood industry, seafood products, etc. "Fish products" include shrimp, scallops and prepared products, and the word sjömat (seafood) is only slowly being taken in use in Norway.
Translators note.

TABLE OF CONTENTS

	PAGE
1. INTRODUCTION	9
2. STUDY PLAN	11
3. MARKETING INFORMATION SYSTEM-CONCEPTS AND IMPLICATIONS	13
4. ORGANIZATION OF INFORMATION	19
5. BASIC CONDITIONS FOR USE OF AN EXTERNAL MARKETING INFORMATION SERVICE	24
6. LABOR DISTRIBUTION IN THE FISHING INDUSTRY	27
7. OPERATIONAL STRUCTURE OF THE FISHING INDUSTRY	29
7.1 THE PROCESSING INDUSTRY	29
7.2 THE HARVESTING SECTOR	34
7.3 THE EXPORTING SECTOR	35
7.4 THE AQUACULTURE INDUSTRY	36
8. ORGANIZATIONS IN THE FISHING INDUSTRY	39
8.1 ADMINISTRATIVE ORGANIZATIONS	40
8.2 INDUSTRY ORGANIZATIONS	41
9. PRODUCT STRUCTURE IN THE FISHING INDUSTRY	45
10.MARKET STRUCTURE FOR NORWEGIAN SEAFOOD PRODUCTS	49
11.TARGET GROUPS FOR MARKETING INFORMATION	55
12.SYSTEM ORIENTATION TOWARDS PRODUCT GROUPS	59
13.SYSTEM ORIENTATION TOWARDS MARKETS	62
14.OUTLINE OF INFORMATION SYSTEM-MARKETS	64
15.OUTLINE OF INFORMATION SYSTEM-RESOURCES	68
16.RESULTS OF A SURVEY	74
17.ORGANIZATION OF INFORMATION IN OTHER EXTERNAL SYSTEMS	95
18.PRINCIPAL MODULES OF THE SYSTEM	109
19.WHAT INFORMATION - THE SYSTEM PART	110
20.WHAT INFORMATION - THE DATABASE PART	118
21.INFORMATION SOURCES FOR THE SYSTEM	124
22.MARKET INFORMATION AND MARKET MONITORING - MANPOWER REQUIREMENTS	130

23.COMPARISON WITH OTHER INFORMATION SYSTEMS 132

24.AREAS FOR FURTHER STUDY 134

25.LITERATURE 136

26.ATTACHMENTS

DECISION - MAKING ANALYSIS - DETERMINATION OF INFORMATION NEEDS - TESTING A METHOD 145

FACTORS AFFECTING OUTCOME OF INFORMATION SYSTEM PROJECT- SUMMARY OF A LITERATURE STUDY 169

INFORMATION SYSTEM - AND DECISION MAKING ANALYSIS METHODS FOR DETERMINING INFORMATION NEED AND SYSTEM DESIGN 183

DECISION MAKING PROCESSES AND - CATEGORIES 202

DECISION MAKING SUPPORT SYSTEM FOR DISTRIBUTION CHANNEL DECISIONS - A ROUGH OUTLINE 218

MODELLING SEAFOOD MARKETS 236

CONCLUSION 248

LITERATURE 256

PREFACE

Access to information on market conditions is one requirement that must be met by any industry in order to realize an objective of increased market orientation. That such an increase is one of the most important strategic objectives for the Norwegian fishing industry,seems to be generally accepted by both the public and private sectors of the fishing industry in this country.

Market orientation has been a recurring theme on fishing industry conferences, in lectures and in trade publications over the past five to ten years.

There are probably a number of definitions for the concept market orientation, and each of these would stress different sides of the activities taking place in a company. We stress two aspects of the concept: First, market orientation means that senior management perceives the markets and the changes occurring in the markets, as a decisive factor that the firm must react to. In other words, market conditions have a direct effect on the activities taking place within the concern, both on the strategic, administrative and operative levels.

Since this study is focused on the fishing (seafood) industry, it would be natural to compare how the industry behaves to another basic condition, namely the biological resources. Changes in the resource base can lead to accelerated or postponed investments, to changes in production , to new markets opening up while markets that the firm had earlier produced for and sold their products to, are neglected. A market oriented fishing industry would adapt to changing market conditions in a similar manner even if the changes would not be as dramatic, since the changes in the basic conditions in themselves occur over a longer time and are less dramatic. Market orientation (p.2)
thus means that market condition are carefully monitored, changes noted and planning and actions taken accordingly.

Second, market orientation means that the participants must possess sufficient competence and knowledge in the field of

marketing. Such competence could be obtained through formal education or through practical experience in the trade. Usually both these sources of knowledge will be employed, but at differing proportions. In other words, market orientation means that there is knowledge both to interpret market signals, and to act on them both in the short and long term. One of the requirements for this is ready access to information on relevant market conditions.

Both of the two elements we emphasize in the concept market orientation therefore require both knowledge and information.

To increase the level of knowledge or competence in the area of marketing and market economics is a long term task or process where events like a generation change in senior management will play an important role.It can also be seen as an awareness-creating process which to some extent can be speeded up through formal training.

If the expertise we have in the fishing industry is to be activated and contribute to increased profitability through market orientation, decision makers must have access to information bases and information streams on conditions in the markets. To create data bases and information streams on market conditions is a tremendous challenge. There are many markets to be monitored, and the information need related to processing of the most well defined product - and market combinations (p.3) is complex. If increased market orientation is defined as an objective, this means an added commitment. In our opinion it is then necessary to increase efforts on market monitoring and market information. When this has been accepted, the decision maker must focus on how the monitoring is to be done and how the market information should be disseminated.

Today these functions are performed in different ways. Each firm or each organization that regard market conditions as one of their basic conditions, have created their own market information systems. With the term market information system we mean the processes, people and the equipment the organizations use for

monitoring, collection, processing and storage of market information. For an exporter, telephone contacts with customers and colleagues will be important components in such a system. For the Norwegian Raw Fish Marketing Cooperative, statistics, the network of student envoys (Fiskeristipendiat), trade periodicals and marketing reports would perhaps be the most important components. The marketing information systems will in general be supplied information from printed, human or electronic sources. The monitoring system, the sources, the organization of the information and the information processing would be adapted to who the user is, and for what purpose the information is to be used.

It is probable that marketing information systems will always consist of these three components. Each component will have strong and weak sides relative to given types of information. A verbal source is rapid, a written source can supply information in depth, an electronic source is easily available, can be flexible, "intelligent" and have high capacity.

FTFI (Institute of Fishery Technology Research) have carried out two preliminary projects to evaluate the role information technology can play in the marketing information systems of processors and exporters in the fishing industry. The present report discusses possible uses of information technology (p.4) in this context.

The report consists of two parts. The first part discusses some important factors for establishing such a system. The number of users, their needs and qualifications for use of market information is surveyed and discussed. The same is done with the different sources of information that can supply a system. An outline of a system is finally given and how the information could be organized.

The other part consists of a collection of notes where different problem areas in connection with the development of an information system are discussed, some methods tested and evaluated. Included is also an outline of a so-called decision

support system for choice of distribution channels and an evaluation of the use of micro market models as components in the information system.

In the concluding section we attempt to draw conclusions of the work done up to now, and to establish guidelines for further work.

1. INTRODUCTION (p.5)

In the fall of 1985 FTFI was engaged to carry out a study that should form the basis for further developments of a marketing information system for the fishing industry. The study should specifically address the development of a uniquely Norwegian system based on needs and opportunities in the Norwegian fishing industry.

The report of this study is presented here.

The principal approach to the study has been to see if a separate Norwegian market information system could or should be developed, and in the next instance, how such a system should be formulated.

Translated into practical work, this has made it necessary to survey and determine the groups in the Norwegian fishing industry that could be considered to be potential users of a system like this.

All groups are dependent on market conditions and can as such be considered to be target groups. However, the degree of usage would be quite variable, and we still give priority to the groups based on this premise.

More than for most products and/or services, acceptance and use of EDP- based decision support systems are dependent on a close adaptation between need and the formulation of the product. There have been many examples of systems having been developed without near contact with the users in various stages of the development work. These systems have not been accepted as a useful tool by the users and were therefore rejected. Choice of target groups is therefore to a large extent a part of establishing the basic conditions for developing the system.

In this report we have therefore placed considerable emphasis on harmonization in the choice of user groups, needs and conditions, and system development. These are two important basic conditions for the system.

A third condition that must be considered in the formulation of a Norwegian system is the availability of sources for the

system. Even if the user groups have been identified ,the user group's needs, conditions and use of market information specified, and information related to this has been organized, it is a necessary condition for constructing and operating the system that sources be available to supply information for it. The most important sources have been surveyed and are listed in the report.

Based on identified target groups, perceived needs and use, and sources of market information for the fishing industry, we have outlined some suggestions for what information the system should be disseminating and how this information should be organized.

An external market information system will be evaluated by potential users as an alternative to the sources utilized by the concerns at the present time. As a last part of the report, based on the other sources, we have outlined a strategy for profiling the system relative to these.

For evaluation and use of the study, we believe it is important to emphasise certain conditions.

First, the development of an information system like this must be considered to be a continuing process. The areas of application that are identified in this report are in no way exhaustive. Experience has shown that development of an information system takes a long time, and as the users become familiar with the system, they will themselves repeatedly be able to find new areas of utilization for this technology and/or concept. Our proposals for areas of use are based on (p.7) general knowledge of the industry and on a limited survey. We have not by a long shot talked to the whole industry. Furthermore, the fishing industry exists in a pronounced dynamic environment. The resource situation is changing constantly and new resources are being utilized. The same applies to the market situation for the individual products, and to a certain degree the technology that was utilized. Furthermore, there is a continuous product development activity nationally and

internationally which contributes to changing the product composition in the industry. The information requirements will be closely tied to these factors and will change continuously with changes in these. Finally, computer- and communication technologies are in rapid development, both with respect to equipment (hardware) and software. This together with the fact that more and more information in the future will be available electronically, means that the system could be expanded and improved with time.

This preliminary report is therefore in no way presenting a final outline of what a market information system should contain. The system should be continuously developed and modified following dialogue with the users and as computer availability and communication technology is improved.

2. STUDY PLAN (p.8)

As mentioned in the introduction, the objective of the project has been to study two relatively separate problem areas:

First the intention is to elucidate if there is basis for establishing an external market information system with the whole, or part of the Norwegian fishing industry as the target group.

Second, the report shall propose an outline for the formulation of an information service like this.

In our work on the basis for an external market information service, the starting point has been a study of the structure of the fishing industry. We have identified which groups of participants (plants and organizations) there are in the fishing industry. The sizes of these groups have been determined. We have further determined some qualitative sides of each group as to what their actual functions are. With a basis in this structural analysis we have presented proposals on which target group the development of the system should be concentrated on.

In association with the work to survey and evaluate possible

target groups, we have also looked at the internal conditions in the various enterprises for the development and use of an external market information service. In this part we have used data on the competence and distribution of resources on different work functions in the fishing industry.

In evaluating the need for market information and target groups, we have further used data from a questionnaire sent to processing- and exporting concerns. Some personal interviews with key personnel in the individual groups have also been carried out.

The other part, the development of the system, is primarily based on a survey of decision areas that are supported by market information (where important basic conditions are to be found in the markets). This is done through interviews and questionnaires. The interview study is also designed to clarify the present marketing information systems in the companies, the degree of market orientation and the companies knowledge of, experience with, and attitudes to, external marketing information systems.

We have further gone through different forms of production statistics to identify most of the important export products of the Norwegian fishing industry. This, together with a survey of the important markets for Norwegian fish products, has given us a basis for giving priority to product groups and markets the system should target for information dissemination. In the closer identification of market factors that should be monitored and information disseminated on, attempts have been made to identify aspects of the market models the industry is working from; i.e. which conditions are important in evaluating market conditions.

The summary given above gives a picture of which information is desirable and requested by the industry. The information that is actually to be disseminated must, however,be based on a compromise between this and the information available, and can in practice be handled by a system; i.e. the requirements this will

impose on routines for registering data and events. In order to consider these conditions, we have studied and categorized the most important sources from which a system can be constructed. On the basis of these two conditions, we have given an outline of the information the system should take aim at disseminating, and how this should be organized in view of the decisions that must be based on t[illegible] information in the system.

In the coverage of the Norwegian fishing industry,we (p.10) have made two exemptions in that we have excluded the canning industry and the fish meal- and oil industry. This is done because markets for these products in many ways are clearly different from the other Norwegian fish products and would have to be discussed separately. Furthermore, the structure of the export channel is considerably different and have therefore other requirements and conditions than the rest of the industry.

(p.11)

3. MARKETING INFORMATION SYSTEM - CONCEPTS AND IMPLICATIONS FOR SYSTEM DEVELOPMENT

A key concept in the collection, processing and use of marketing data is " marketing information system". We will analyze this concept more closely because it is a good starting point for clarifying the tasks a joint market information service for the fishing industry should be concentrating on. This will be done both in general and relative to the information inflow to companies at the present time. The concept also gives some general guidelines and ideas for the strategies to be chosen for the development and establishment of such service.

It is obvious that the fishing industry has specific information needs based on the raw material situation, processing processes, product composition, competence, structure etc., but part of the basic conditions for developing EDP - based information systems will also apply here.

The term marketing information system covers the total activities of a company in connection with collecting, processing and presenting market information. Such a system will normally receive information from several sources such as newspapers, personal communication, statistics, special reports, market visits, participation at fairs etc. The information could or could not be EDP based. Developments in most sectors are now moving towards collecting, processing and disseminating electronically parts of,or most of the market information used by the company.

The processing of the information can be done formally by having raw data analyzed in especially developed models. This is done more and more in sectors where the units are large and therefore able to hire trained staff for this purpose. (p.12) Development of the models used in such systems is a pure marketing job, and operation and interpretation of the results will also require highly qualified staff.

In sectors such as the fishing industry with a typical small plant structure and relatively low educational level, information on the individual factors that affect the market conditions is based more on intuition and experience.Thus, the relationship between factors and goals need not be expressed explicitly in a model.

The volume of data,and the resources to be used for collecting and processing data, will vary from sector to sector, and also between companies.

For some types of companies it will only be of interest to keep informed on market conditions through ordinary news media and trade publications. This can be sufficient in sectors with stable market conditions, or where sales, marketing and the market monitoring functions are handled through a joint organization.

Many companies in other sectors place a high priority on their work on market information and have their own divisions for this work. The emphasis placed on market monitoring and market

studies depends on how quickly and how much market conditions for their products change. A turbulent market situation together with a strong dependence on certain markets will make it necessary to place a lot of effort on market monitoring. Conditions such as changes in the raw material situation will alter the product mix for the fishing industry and thereby cause changes in markets that are most important to monitor. Otherwise, competence in assessing market conditions will be an important factor in determining the formulation and extent of the marketing information system of the company and the active use of market information.

Cox and Good (1967) point out that there must be a balance between the system and senior management. This means that information that is generated through the market information system must be adapted to the manager's market model and the decision models used. Cox and Good (op.cit.) claim that the generation of more and more information will not automatically lead to better decisions. Upgrading of management, i.e. increased understanding of the factors that affect market conditions and which decisions that must be taken during changing market conditions,must occur in parallel with the upgrading of the information system of the company.

The concept of a marketing information system therefore encompass systems of various complexities, but normally the concept is used only in cases where the work with market information is to a certain degree characterized by structure and systematics.

A commonly accepted definition of a marketing information system was given by Brien and Stafford (1968):

> "A marketing information system is an interactive unit consisting of people, machinery and procedures with the purpose of generating an orderly stream of information, from internal and external sources, that are to form the basis for decisions by marketing managers."

In principle,the marketing information system is not limited to information to support a certain type of decisions beyond the fact they are being used by marketing managers. The system can in other words give priority to long term information as a basis for strategic decisions ,as well as short term information as (p.14) a basis for price setting and allocation of products between customers and markets from a given raw material or product quantity.

Choice of the type of information the system shall primarily produce has, however, implications for the resources the operation of the system will require. Short term information for the support of operative decisions will normally be less available and must be updated more often than long term information. In some cases the short term information will also be very qualitative and have such a short life span that it is not suitable for inclusion and distribution through an EDP based system.

With reference to Brien and Stafford's definition of a marketing information system, this means that the unit is structured, that the information made available through the system is organized and that it is presented in a form that is adapted to the decisions that it is to support.

We have illustrated this point with the help of a simple decision model below.

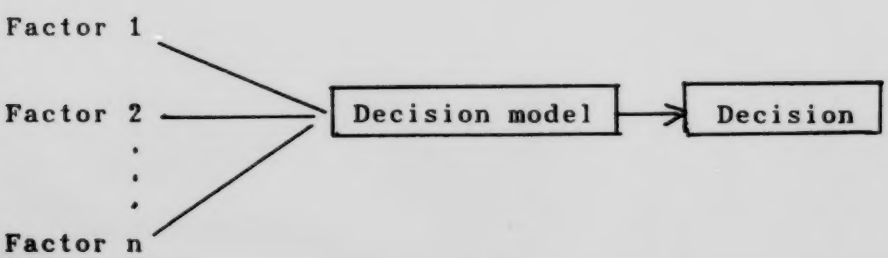

Figure 1. A simple model for decision making.

The factors 1-n are conditions the decision maker means are of importance for the decision he is to make. This model is general, but the point that we would like to bring out is that the decisions are built on some concrete factors that <u>together</u> gives a situation description of ,or outlook for,a product like for example the market for fresh salmon.

To be able to make a decision ,the decision maker must have information on the specific factors that he means is of importance for evaluation of the market situation. Which factors that are given importance can be different from decision maker to decision maker based on experience, educational background, the product variants produced, customer composition, market composition etc. The most important point is that the information, to the highest degree possible,is adapted to the models that the decision maker is working from.

Before an information system is put together, it is therefore necessary with a thorough analysis of information needs with reference to the decisions actually being taken in the company. This means that the development of the system must occur in close cooperation with the users, and that the users define their own information needs to the highest possible degree. Assembly and use of sources of information, processing, updating and organization must then occur with the intention of adapting the information to suit the needs and situations of the user.

In earlier phases of the work with EDP - based market information systems ,the basic idea was always to develop a total system that would cover all information requirements in connection with markets. The systems were often thought to be constructed of a database for quantitative raw data and a model base to process the data. Together these two modules should give more or less exact answers to most marketing problems. However, it has been demonstrated that many problems are very difficult to program, and that the availability of data to run (p.16) programs is limited. The tendency now, in the development of information systems ,is that the system is gradually built up and

concentrated on a few, but important key factors that affect the market conditions for the sector in question (Rockart, 1979).

It has also been noted that there are several limitations in developing and implementing such a system. The users of the systems often have very limited competence in data processing which is reflected in a high threshold against taking in use EDP - based systems. That the system developers often have been marketing economists with a pure economic background, has led to communication problems between the systems and the users. This creates a disparity between the information requirements of the sector and the information that is made available through the system, both with respect to the type of information and the organization of the information. The ambition level of the jobs for the information system is also lowered.

An important source of information for management is conversations with other people at the leader level. The information disseminated by this method is often personal opinions, more or less confidential information etc. that is not suitable for entering a system. The same applies to much of the information obtained through market visits and participation at fairs, shows etc. Exposure to ordinary news media, meetings and a number of other activities will also not disappear when entered into an information system. It is therefore important to clarify the position of the EDP - based information system relative to the existing sources of market information. The system will not make these information sources obsolete. The strategy is rather to find areas where the system can supplement and improve the information systems the company already has and have been using to make decisions.

In newer literature on the development of marketing (p.17) information systems and decision making support systems, several authors recommend that development of the system be managed by a separate reference group with representatives from the individual users and system developers (Johansen, 1981, Sprague and Carlson, 1982, Rocart and Crescenzi, 1983). The user representation in

this reference group serves two purposes:

First they are participating in assuring that the system later produces information that is relevant and in a form that as directly as possible can go in as input to the decisions the system is to support.

Second, the participation functions as training for the users. They become familiar with the system and become less skeptic against the changes in the work routines that are inherent in the system.

Both these purposes lead to an easier implementation of the system.

A development process like this with direct project management of the users is feasible for systems that are tailor made for each company. It will be more difficult to use in cases where a joint system for a group of companies is being developed, especially if the companies have very different information requirements.

The principal conclusions from this literature search are that there are the following general limitations to a market information system:

The system must be user oriented.

This means that the users must, to as large an extent as possible,define the information that is to flow through the system. The information must furthermore be organized in a way that is closely adapted to decision models and market models used by the users.

The system must fit into other sources of information used by the users.

It is therefore not the intention to create an all encompassing system, but it is known already in the beginning that much information will be more easily accessible and easier to disseminate through other media and from other sources.

4. ORGANIZATION OF INFORMATION FOR DECISION MAKING - SOME GENERAL GUIDELINES (p.19)

The information requirements the management of a company is facing, will in most cases fluctuate from decision to decision. Each company, and of course each sector, have their specific information needs based on factors mentioned in the last section. There are still similarities in the types of decisions senior management and the marketing divisions must take in the various companies. These are decisions tied to subject areas that to a high degree is independent of company or sector. Some of the decisions affect daily operations. The results of these decisions have consequences for the short term achievement of goals. Examples of this type of decisions are price setting on the spot market, purchase of raw materials and utilization of raw material in relation to a given market situation. Other decisions are of more long term character and affect future company strategies.Examples of these are strategies for cultivating a certain market, choice of markets to cultivate, composition of customer mass, establishment abroad, choice of raw material, choice of production process etc. The long and short term decisions are interdependent in that the strategic decisions often give guidelines for those decisions that are to be taken in the short term. An example of this is that a certain customer policy could have consequences for short term sales decisions. If a company has decided to hold on to a certain customer group and gives priority to these in periods of raw material shortages, the sales will be guided by that and not only by the prices that can be achieved in the short term on a spot market.

It is customary to divide the types of decisions into three,

namely strategic, tactical and operative decisions. The definitions of the various types of decisions are given below:

Strategic: Deals with what products the company shall (p.20) offer, the volume of these and to whom they should be sold.

Tactical: Choice of necessary resources to realize the strategic decisions.

Operative: Best and most effective utilization of the resources available at any time.

The types of decisions and the decision situation is qualitatively different in that the result of the decisions is of different importance for the company. A qualitatively poor decision on the strategic level can be fatal for the company, while a miscalculation of the spot market price for a lot (operative decision) will not have the same consequence.

The decisions require different types of information as input, and the lifetime of the information is different. Short lifetime for the information sets high requirements to routines for collection and processing and leads to high costs in connection with collection and updating. The availability of the information will generally be better for strategic decisions than for operative. Collection, registration, processing and dissemination of information take time. Strategic and tactical decisions are usually based on a longer study phase where trends and prognoses regarding the overall conditions for the company are surveyed. These are conditions that usually change slowly and thereby often has a higher degree of predictability than the daily changes in the raw material - and market situations. There is furthermore often a lot of material available such as statistics and resource outlooks for both competitors and own industry, consumption trends, macroeconomic and political conditions (limits) in market countries, special reports, expert

opinions in trade journals, and own knowledge of the industry.

In addition, there will usually be plenty of time to (p.21) collect and process data and evaluate the situation, and then to make a decision based on this evaluation.

Operative decisions must in many cases be taken "on the run" without long deliberations. The relevant conditions that affect the market situation can change from day to day and the decisions must to a larger degree be taken by intuition.

These points are summarized in the figure below:

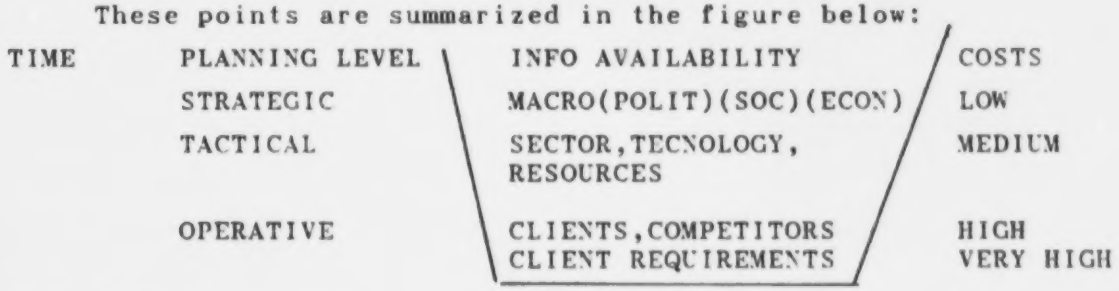

FIGURE 2. Relationship between planning level, information-flow and costs. From Hempel (1981).

The figure illustrates that the costs connected with information collection increase as the time of sale is approached. The funnel in the figure is meant to illustrate that there are fewer and fewer sources of market information, and that these become less available as the time of sale is being approached. This is a general condition and apply for most sectors. In the export of fish, the market conditions for most products (especially for fresh fish) will have short term swings as a result of changes in supply to the markets,supplies in storage and demand. These are conditions that can change noticeably from day to day (this applies especially to supplies). First, some of the changes are difficult to predict since they depend on a number of individual decisions that cannot necessarily be quickly identified, in addition to external factors (weather and ice conditions) that can affect unpredictable changes. Second, information and short term changes

in market conditions are to a high degree internal and thereby unavailable for other that the market participants themselves.

In addition to the division of decision types into three; strategic, tactical and operative, the decision types are divided into structured decisions and non-structured decisions (Gorry and Scott Morton, 1971). The structured decisions are decisions that are repeated time after time and where the decision procedure is the same or approximately the same each time. As an example of this we can take a fresh fish exporter that calls around to suppliers and bids on fish, receives reactions from these with information on competitors price offers, calls or telexes offers to a number of customers and receives their reactions with information on competitors prices, and then takes a new round of telephone calls to contacts domestically and abroad to get information on the supplies to important fishing ports before he arrives at a market price for the fish. A structured decision is characterized by the fact that the same sources of information on the same factors are used each time even if the information qualitatively is changed from one decision situation to the next.

The un-structured decisions are characterized by the fact that they are not repeated and that there are no routines for the decision model to be used, or for information collection, processing and evaluation. As an example of this type of decision we can choose the decision to start exporting to a new market.

It can be said that only a few decisions are purely (p.23) structured or unstructured, and that there is a continuous transition between the two types. The concepts will still serve as a basis to segregate decision types that dominate within a sector, and we must in the next instance take a position to which consequences this has for the information system. If the decisions that the system is to support are structured, the whole or parts of the decision process can for example be automated with the help of operational analytical methods. If the decisions are to a large extent unstructured, the decision process cannot be automated, and the principal task in the system development

process is to identify key factors that management is evaluating and to organize the information relative to these.

Market related decisions within the fishing industry seem to us to be located somewhere between these two extremes. The factors that are used as a basis for these decisions will often be the same time after time in evaluating the market situation, while the evaluations themselves, where each factor is weighted relative to a problem (for example setting a price), and the final decision, are not explicit enough to be automated.

5. BASIC CONDITIONS FOR USE OF AN EXTERNAL MARKETING INFORMATION SERVICE

We will in this section discuss the internal conditions and limitations that will affect to what extent businesses within the fishing industry are ready to take in use an external, EDP based market information service. With the expression internal conditions and limitations we mean competence among the employees in the business, which work tasks are being performed and the priorities between these. These are conditions that will affect the ability to utilize an external information service, and simultaneously, these conditions contribute to give an indication of which use the processing plants can have of market information in their daily tasks.

The formal competence of the management group in the fishing industry is relatively low compared to other industries. The industry is to a high degree production oriented, and the administration staff is in most cases kept at a minimum level. The administrative functions that are given priority are in most cases kept at a minimum level. Administrative functions that are given priority are pure routine tasks such as bookkeeping,

payrolls and registration of fresh fish purchases. In the smaller businesses, a considerable part of the manager's time is used for practical processing tasks, and the planning function in relation to markets and other external conditions seems to be given a lower priority than the daily tasks. No extensive studies have been done to survey the use of time and work areas for the management in the various sectors of the fishing industry. The description here is based on an empirical study of the fishing industry in Northern Norway, and the conclusions are therefore formally limited to this part of the country. We still have an impression that the fishing industry also in other areas of the country is characterized by low educational level and little emphasis on administration.

The table below gives some information on the formal education of plant management.

Table II. Formal education of plant management.

Education	Conventional plants Average	Filleting plants Average
Econ./Adm.	7.5 months	20.7 months
No. of courses in last 5 years.	0.2	0.6
Techn.	1.8 months	3.9 months
No. of courses	0.0	0.1

Source: Bertheussen, 1982

Without pulling in directly comparable values from other sectors, the table shows that the formal competence of management in the fishing industry is low. We believe that the competence is considerably lower than in other industries with corresponding plant structure. This applies especially to the conventional (fresh, salted- and dried fish) part of the fishing industry. Plant managers in the filleting industry has more than twice as long formal education, but education on the university level is

unusual also here. There will not necessarily be any direct connection between formal education and use or not use of an external information service, but the cognitive style and the development of an analytical ability is affected by education so that the users can easier accept information in a structured form as it appears from an EDP based information system. The threshold against taking in use EDP as an aid will in most cases be lower in users with higher education.

If we look closer at the time allocated by leaders in the fishing industry, we found that most leaders use a large part of their time for pure production work. The table below shows this expressed in percent.

Table 12. Time allocations by leaders (managers) of fishing industry enterprises (plants). (As part of the working day used for practical processing work).

	No time	> 1/3	1/3-2/3	>2/3
Small plants	14%	25%	17%	44%
Large plants	29%	42%	12%	17%

Source: Bertheussen, 1982

The table shows that most of the leaders in the fishing industry are involved in the practical processing work "on the floor". This is especially common in the small plants that are chiefly conventional plants (fresh,salted,dried), but also in the larger plants are only one third of the leaders completely freed from processing work. Caution should be used in interpreting these results since the selection of plants used for the study are all located in Northern Norway. It has been traditional, and it is still widespread, that a considerable part of the

production in Northern Norway is exported by companies in Southern Norway. When the sales- and marketing function is performed by the company itself, more of the management's time will be allocated to external conditions, and that less time and energy goes to participation, planning and control of the production itself. A study of the time allocation of managers in southern Norway would probably show a distribution with less weight on the processing functions.

6. LABOR DISTRIBUTION IN THE FISHING INDUSTRY- HARVESTING, PROCESSING AND EXPORTS (p.27)

The fishing industry is characterized by the fact that there is an established division of labor between the harvesting function, processing and exports. Very few of the processing plants export their own products. Very few of the vessel owners or operators carry out further processing of fish products or export their own products. Among these are some factory trawlers and shrimp trawlers. It is , however, more common that exports are carried out by specialized companies that buy the products from the processing plants for further sale. The most common type of export enterprises is a company that has some production itself and in addition buys from others for exports. Another type of export organization is producer organizations where several processors have jointly established a sales office. This marketing form seems to have been successful in the fish farming industry. There is in addition a group of pure traders and agents that buy, sell or act as intermediaries without themselves doing any processing. The focusing on markets, and the debate in Norway on liberalizing the Export Act has led to more processors exporting their own products, but the pronounced small-plant

structure in the Norwegian fishing industry will mean that the division of labor between processing and exports will to a large extent remain.

An organization that is to carry out exports must have a license. A license is issued for a product or a product group so that the exporters often specialize on fresh fish, dried fish (stockfish), salted and dried fish (klippfish), frozen fish etc. Some companies also have export rights for several products. Exports of fresh and round frozen products are free. The same applies to exports of salmon and shrimp.

Some of the exports are also centralized in that the organizations have a monopoly by law for the export of certain fish products to further specified markets. This applies (p.28) for example to Eastern European markets and for frozen fish to the U.S. marked.

We will return to the structure in the exporting sector under the description of the plant structure in the fishing industry.

This division in three of the harvesting, processing and exporting functions also carries over to the organizations where each of the groups have their own organizational apparatus. Schematic this is shown in Figure 3.

Participant Group	Organization
Fishermen, vessel owners	Norw.Fishermens Org.
Fish processors	Processor organizations
Exporters	Export organizations

Figure 3. Distribution of labor in the fishing industry.

The fifth active part is the fisheries organization which plays a considerable role in an industry as thoroughly regulated

as the fishing industry.

We can today see outlines of new organizational forms. For example, vessel owners go together and establish processing and sales companies. Production onboard has also reached a considerable level. In the future it can therefore be expected that there will be further changes in this pattern.

7. OPERATIONAL STRUCTURE IN THE FISHING INDUSTRY

7.1 The Processing Industry

In this part we will go through the business structure of the fishing industry. The purpose of this is to give a general view of potential users of a market information service. In the survey the companies are presented by counties and according to the principal products turned out at the plants. A market information system must be constructed around the individual products. How many plants that produce salmon, stockfish, frozen fish, shrimp etc. will therefore be of importance in determining the construction of the system, the priority given to the products that the information is to be concentrated on,and the evaluation of the market for an information service.

In the next section we will go through the various types of plants and discuss the use of market information in connection with the activities taking place at the concerns.

The distribution of activities within the processing industry is characterized by the fact that most of the processors do not carry out exporting activities themselves. Processing and exporting enterprises are therefore presented separately in the tables following on the next pages. However, some of the processors also export and are therefore listed in both places.

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Tabell 1. Fiskeindustribedrifter i Norge. Etter fylke og produksjonsform (1985)

Table 1. Fish processing firms in Norway. By county and processing method (1985)

	Prod.form	Finnmark	Troms	Nordland	Nord-Trøndel.	Sør-Trøndel.	Møre/ Romsdal	Sogn/ Fjordane	Hordal. Bergen
Fresh	Ferskfisk pakking	105	86	290	19	56	84	50	14
	Filetering	43	32	60	5	14	27	5	3
Freezing	Frysing	86	62	83	6	32	54	22	11
Sec.proc.	Videref.	3	-	1	-	1	-	-	-
Smoking	Røyking	3	5	9	2	-	8	-	5
Drying	Tørrf.tilv.	93	77	195	16	37	101	7	2
	Saltf.	93	80	195	16	40	128	55	10
S & D	Klipp	1	1	2	-	-	81	8	1
Herring	Sild	15	34	123	10	15	28	7	5
Shrimp	Reke	27	25	17	4	11	8	5	3
Peeling	Rekep.	22	15	13	2	5	7	-	2
Capelin	Lodde	13	-	-	1	-	-	-	-
	Totalt	119	98	352	22	69	183	50	42

Tabell 1. Fiskeindustribedrifter i Norge etter fylke og produksjonsform (1985).

Table 1. Fish processing firms in Norway. By county and processing method (1985)

Prod.form	Rogaland	Vest-Agder	Aust-Agder	Telemark	Vest-fold	Buskerud	Oslo	Øst-fold	Total
Ferskfisk	25	25	6	3	6	3	18	7	738
pakking	10	6	3	–	–	–	–	2	210
Filetering	22	8	3	1	–	–	–	2	392
Frysing	–	–	–	–	–	–	–	–	5
Videref.	5	1	–	–	1	3	7	3	52
Røyking	–	–	–	1	–	–	–	–	532
Tørrf.tilv.	13	12	–	1	3	3	15	4	668
Saltf.	–	1	–	–	–	–	–	–	95
Klipp	18	3	–	2	–	–	3	1	263
Sild	18	19	6	3	4	–	–	2	152
Reke	10	6	1	–	2	–	–	1	86
Rekep.	–	–	–	–	–	–	–	–	14
Lodde									
Totalt	58	33	7	4	8	2	18	9	1074

See p. 30

Kilde: Fiskeridirektørens register over godkjente tilvirkningsanlegg for fisk og fiskevarer, Fiskeridirektoratet, Bergen, 1985. Source: Dirctorate of Fisheries, Bergen

The table shows how many firms that are approved for each type of processing. Plants are usually licensed for several methods of processing at the same time. However, there are considerable variations in the combinations of processing methods even if there is also here a pattern that we will comment on later. The structure shown in the table is the one that existed in 1985, and this could also change with time as the resource situation and market conditions change.

It can be seen that the greatest number of plants are licensed for producing fresh fish. A total of 738 companies, or 69 % of the total, carry out some production of fresh fish to some degree. Fresh fish production is, however, a secondary activity for most of the plants. These enterprises usually have conventional processing as their principal activity (stockfish, wet salted fish and to a lesser degree, salted and dried fish (klippfish)), and some of the raw material is packed for the fresh market in periods with especially good prices, or in periods when the climatic conditions are not suitable for conventional production.

Production of wet salted fish is the second most important processing method measured in the same way. The quantity of salted fish produced has also been an increasing part of conventional processing since the stockfish crisis on the Nigerian market in 1981. A total of 668 plants, or 62 % of the total concerns have licenses for producing salted fish.

The other processing methods ranked as follows:

Stockfish processing :	532 plants (50 %)
Filleting plants:	210 plants (20 %)
Shrimp plants:	152 plants (14 %)
Klippfish (s&d):	95 plants (9 %)
Shrimp peeling:	86 plants (8 %)

In this ranking we have not included plants under the grouping of "Salting of herring". A total of 265 plants had approval for this type of processing, but due to the poor

resource situation for herring, the quantity produced has been low since the beginning of the 1970's. The resource situation for herring has changed, and as catches are increasing, there could be an upswing in this type of processing.

With respect to the other forms covered by the table, they ranged from 52 for smoking to 5 for secondary processing of fillets that had approval for these activities.

Among the combination of processing methods, the combination of stockfish and salted fish is very common in the three northernmost counties. More than 99 % of the conventional plants had permits for both these methods and also for fresh fish. With respect to the size of the plants in the three northernmost counties, a total of 24 % of the plants had at least 5 employees on average on a yearly basis. (Central Bureau of Statistics, 1985). This is also the same as the average for the country. A large part of the conventional plants in Nordland county are only in operation during the Lofoten spawning cod fishery. These are plants where the administrative functions are performed by one person, most often in combination with practical processing work.

In Western Norway (Möre and Romsdal, Sogn and Fjordane counties), the combination salted fish/ klippfish / fresh fish is most common. In this part of the country the number of large plants (at least 5 employees) was 35 % of the total. (p.34)

The fish filleting and shrimp processing plants also have licenses for conventional processing and fresh fish production. However, the principal activity of these plants is fillet- and/or shrimp processing.

The average plant in the processing industry had in 1983 a total of 22 employees. The conventional plants had on the average 12 employees, the filleting plants 54 employees. A total of 155 of the plants had less than 5 employees.

7.2 Structure of the fishing industry- the harvesting sector.

The harvesting sector of the fishing industry is chiefly organized in private companies with one vessel. Vertical integration between fishing vessels and processing concerns occur between fresh fish trawlers and filleting plants, but numerically these do not comprise an important group. The processing and sales functions are handled by independent units that do not have any formal association with the vessels. There is also a certain amount of secondary processing taking place onboard vessels. This applies to a smaller number of purse seiners, factory trawlers and shrimp trawlers.

The table below gives a summary of the number of fishing vessels according to size.

Table 2. Fleet structure in the Norwegian fishing industry, 1978 - 1983.

Year/ Vessel type	1978	1979	1980	1981	1982	1983	Change % 1978-1983
Under 10 m	3381	3605	3852	4243	4534	4843	+ 43 %
10-19.5 m	3364	3334	3378	3388	3488	3285	- 2.3 %
20-29.9 m	538	514	488	445	439	418	- 22 %
30 m og over	582	552	507	459	445	423	- 27 %

Kilde: Statistisk Sentralbyrå 1985.
Source: Central Bureau of Statistics 1985.

The table shows that there has been a 43 % growth in (p.35) the smallest vessel group in the period. The number of larger vessels have decreased by respectively 22 and 27 %. Of the larger vessels, 123 had an unlimited groundfish trawl license, 104 had a shrimp trawl license and 160 had a purse seine license.

In total over 26,000 fishing vessels are registered in Norway. Most of these are smaller vessels (more than 80 % open

boats or under 41.3 feet) that could not be considered as potential users of a market information system. Only a few of the vessel owners with vessels under 100 feet can be assumed to have a land based administration. These owners can for this reason alone be largely eliminated as users of a market information service. Of vessels over 100 feet, 423 were registered in 1983.

7.3 Structure of the fishing industry - the exporting sector.

In this section we will go through the structure of the exporting sector of the industry. The method used will be to present the number of businesses with export rights for the individual product groups. To export fresh fish, including fresh and round frozen salmon and peeled and unpeeled shrimps, there is no limitation on the numbers beyond normal approval of the sanitary standard of the plants. For this group of concerns the data are based on the membership list of the Norwegian Fresh Fish Marketing Organization. This organization represents most of the active exporters in this sector.

Table 3 shows the number of exporting enterprises (p.36) within each product group.

Table 3. Number of exporters by product group.

Prod. group	Fresh fish	Fillets	Klippfish	Salt fish	Stockfish
Number	175	19	54	92	67

Source: Producers- and export associations membership lists.

Of these,83 concerns had only permission to sell fresh fish. A total of 18 companies had permits to export both salted fish, dried fish and klippfish (salted and dried), 28 salted fish and stockfish and 28 salted fish and klippfish. Fourteen companies could only export salted fish, six only klippfish and 21 only

stockfish. Of the conventional plants there were therefore 18 concerns with three export licenses, 56 with two and 41 with only one; in total 115 exporting companies. Some of the companies with only one export license are quite active as fresh fish exporters.

In 1985 a total of 29 exporters of shrimps were registered (Council for the Shrimp Sector, 1985). These companies are also registered as fresh fish exporters. A total of 72 concerns had in 1985 licenses to purchase salmon (Fish Farmers Marketing Organization, 1985). Most of these were also active as exporters.

The number of exporters has been quite stable with the exception of fresh fish exporters. The number of these has increased as a result of the salmon and shrimp exports. For the other export products, the structure is tied up in a licensing system that limits the establishment of new plants. The licensing legislation is under review, and any easing of the licensing conditions could lead to an increase in the number of exporting enterprises.

7.4. Structure of the aquaculture industry (p.37)

Aquaculture or fish farming will in this context be included as part of the fishing industry. This is commonly done, and relevant also in this case, since most of the export of farmed fish is carried out by concerns that were established as exporters of fresh fish before fish farming started. Aquaculture is a sizable industry, both measured in the number of installations pursuing this activity, and also measured in production value. Fish farming is also the sector showing the strongest growth in the fishing industry, and is also the sector expected to exhibit the fastest growth measured in value added and employment up to year 2000. Disregarding equipment suppliers etc., the division of labor in the fish farming industry into two principal activities is as follows: The hatchery/smolt producing facilities that supply smolts to the growing-out (cage)

facilities. There are also some facilities that have a combination of hatchery/setting fish (smolts)/growing out(sea cage) activities and the combination smolt/food fish production also exists.

The aquaculture industry has a typical small business structure measured by the number of person years performed per installation. The average size of an installation was 4260 m^3 as of 1/1-1983 . This value has now increased somewhat as a result of new licensing conditions. The production of trout and salmon is still not very labor intensive. The number of person years per installation was in 1983 about 2.8 for hatcheries, smolt producing units and growing out facilities combined. The small business structure is included in the licensing legislation, and this fact, together with the widespread opinion that the activity apparently does not have any special large scale business advantages, means that the structure in the industry most likely will be retained.

The table below shows the number of concerns involved in the production of fish as of 1/1-1983.

Table 4. Farming of fish. Concerns by function and county (1983)

County	No.of registered install. in total	Type of installation: Hatcheries	Stocking fish (smolts)	Growers (cages)
Finnmark	15	3	4	12
Troms	37	12	11	25
Nordland	105	30	26	77
Nord-Trøndelag	37	9	9	30
Sør-Trøndelag	64	14	11	55
Møre og Romsdal	107	39	30	77
Sogn og Fjordane	56	25	19	42
Hordaland	119	40	43	91
Rogaland	44	16	14	34
Vest-Agder	15	11	9	3
Aust-Agder	8	6	4	2
Telemark	13	7	6	5
Vestfold	2	2	1	-
Buskerud	22	16	16	3
Oppland	25	16	15	9
Hedemark	38	29	28	10
Oslo	-	-	-	-
Akershus	6	5	5	3
Østfold	6	5	1	1
SUM	719	285	252	479

Kilde: Fiskeridirektoratet, 1983.

Source: Directorate of Fisheries, 1983

As per 1/1-1983 there were 479 growing out facilities for food fish in operation.

After this table was assembled, there has been a new round of licenses issued with about 150 new growing out (cage) operations licensed to produce food fish. About 25 of these are in operation as of 1/1-1986. The building out phase for fish farming takes at least three years from the time the license has been granted, and there will therefore be a maximum of about 630 installations in operation by 1/1-1989.

Of the 285 hatcheries and 252 stocking fish (smolt) (p.39) installations, a total of 109 of these are non-commercial facilities for producing fish for stocking lakes, rivers etc.

8. ORGANIZATIONS IN THE FISHING INDUSTRY (p.40)

In the following we will discuss some types of organizations within the fishing industry that have some involvement with marketing and market conditions. In a later discussion on user groups, we will suggest which of these organizations would be possible users based on area of responsibility and work tasks.

In the first place it is natural to classify the mass of organizations into government organizations with management responsibilities and private organizations. The public organizations include the fisheries management functions with the Ministry of Fisheries, the Directorate of Fisheries, the offices of the Fisheries Area Managers (Fiskerisjef) and the Fisheries Guidance Councillors (Fiskerirettledere). This delineation is not unambiguous since there are organizations in the industry that functionally both have management functions, and in other areas operate purely as interest groups for certain sectors. If an organization has management <u>authority</u> or not is not relevant here. Which job tasks are actually performed within the organization is , however, of importance for information requirements and in the evaluation of the organization as a possible user of an information service.

8.1 Administrative organizations.

The management organizations in the fishing industry have as a general objective to participate in that the industry develops in accordance with the social economic and regional policies that apply at any time. The influence is exerted through a number of regulations and economic measures. The measures either have the character of benefits , such as income supplements and concessions or licenses, or they have the character of directives or orders, such as in catch regulations.

Most of the work done in the management organizations is planning of developments in the industry on a national, county or municipal level, and decisions on the use of measures in relation to economic developments. Market conditions is one of the factors that has the greatest influence on developments in the industry.

The Ministry of Fisheries is organized with 13 offices or sections and performs studies, planning and management of a sector or functional area within the fishing industry. The individual units in the Ministry of Fisheries are given below:

Administration division
Section for Coastal Administration
Economics and Budget Office
Office for Research and Guidance

The Office for Fisheries
International Office
Office of Fisheries Economics

Exports and Marketing Office
Office for the Fishing Industry
Office for Aquaculture

Of these offices, it would especially be the last five that use market information in association with their activities.

The offices of the Area Managers (Fiskerisjef) perform planning, management and guidance and have the responsibility for developments in the industry on the county and municipal levels. There are today nine offices in the following counties

Finnmark
Troms
Nordland
Nord og Sör Tröndelag
Möre og Romsdal
Sogn og Fjordane
Hordaland with Bergen
Rogaland
Rogaland to the Swedish border.

The most important fisheries counties also have their own Fisheries Counselor who does counseling and has management functions on the municipal level. A total of 58 fisheries counselor offices have been established. In addition to these pure management organizations, there are the export committees (councils) that have certain management functions in connection with the issuance of export licenses and negotiate sales on centralized markets. The export committee offices often have a close association with the exporter's trade organizations and function as an information central for these, for example in supplying market information. There are presently 13 export committees that have a variable number of staff and levels of activity.

8.2 Industry organizations.

The industry organizations were established with a basis in the division of the activities harvesting, processing and exports. The aquaculture industry has in addition their own organizations, partly in parallel with established organizations.

However, exports of farmed fish are organized together with the fresh fish exporters.

The harvesting industry is organized through the fishermen's organizations that have the Norwegian Fishermen's Organization as their central organ. NFO monitors and takes care of the interests of the harvesting sector relative to external groups, such as processors and the government, and negotiates with these , especially in conjunction with setting prices for the raw material, and also the annual subsidy agreement. The individual counties have county fishermens organizations with their own administration. Activities and staffing varies from county to county.

Within the NFO- system, there are also smaller organizations based on vessel type and function. There are presently four such organizations that also have their own administration:

Seine Fishermens Association
South Norway Seine Fishermens Organization
Norwegian Trawler Owners Association
Fishing Vessel Owners Association

These organizations attend to the groups special interests within the NFO system, and take the initiative to studies and come out with public statements on behalf of their members.

The marketing cooperatives have been established pursuant to the Raw Fish Act, and these have a monopoly on the first hand sale (i.e. from the fishermen) within a specific area or for a group of fish species. The marketing coops can be considered to be the fishermen's representatives vs. the processors, and have as their function to establish minimum prices and to secure sales for the fish. The minimum prices are set through negotiations with producers organizations, and in the preparations for price negotiations the marketing coops use market information. The coops has also the right to engage in regular business functions such as processing and sales. This can either be done directly

(for example Skagerakfisk), or through subsidiary plants (for example the Norwegian Raw Fish Marketing Coop.) In the following the marketing coops are listed together with their annual first hand sales in 1980 (in millions of kroner);

Norwegian Raw Fish Marketing Cooperative (1,545)
Norwegian Live Fish Marketing Cooperative (592)
The Fat Herring Fishermens Marketing Cooperative (592)
Sunnmöre and Romsdal Fish Marketing Cooperative (498)
Norwegian Herring Marketing Cooperative (272)
Herring and Sprat Marketing Cooperative -
Iceland Herring Fishermens Cooperative -
Norwegian Mackerel Marketing Cooperative (101)
Sogn and Fjordane Fish Marketing Cooperative (130)
Skagerakfisk (60) (p.44)
Rogaland Fish Marketing Cooperative (51)
Fjordfisk (25)
Hordafisk (25.9)
Small Whale Catchers Marketing Cooperative (11.8)
Porbeagle Fishermens Marketing Cooperative (0.8)
Fish Farmers Marketing Cooperative (ca. 1400 in 1985)

Processors in the district of the Norwegian Raw Fish Marketing Cooperative are organized in the Processing Industry National Association. The principal tasks of this association is to act as the opposite party to the Cooperative in price negotiations. The association also operates the Processing Industry Service Office that prepares background material for negotiations and information for the processors. The fishing industry in southern Norway is organized through their own associations. The industry in this part of the country exports their own products to a much larger extent, and the exporter organizations function as joint organizations for both processors and exporters. As subgroups in the Processing Industry National Association, there are separate sector councils for the product

groups shrimp, frozen fish and conventional products.

The fish farmers are organized in the Norwegian Fish Farmers Association. The fish farmers also have their own marketing arm, the Fish Farmers Marketing Cooperative, which negotiates with exporters on minimum prices, takes care of some of the marketing functions and acts as an information central for the farmers in cooperation with the Norwegian Fishermens Organization.

Second hand marketing, i.e. sales from processor to exporter, is in the district of the Norwegian Raw Fish Marketing Coop. controlled by the Fish Producers Marketing Cooperative (Fiskeprodusentenes Fellessalg, FF) This coop negotiates with the exporters and set business conditions that are binding for the member concerns. FF also buys and sells to exporters on their own and have their own exports. The activity in FF only applies to stockfish and salted fish.

The exporting sector of the fishing industry is organized through exporters associations. These are country wide (p.45) organizations and organize the exporters according to the product or product group being exported. There is a total of seven exporters organizations:

The Norwegian Klippfish Exporters National Association
The Norwegian Salt Fish Exporters National Association.
The Norwegian Stockfish Exporters National Association.
The Norwegian Salt Herring Exporters National Association
The Norwegian Fresh Herring Exporters National Association
The Norwegian Salted Roe Exporters National Association
The Norwegian Fat Herring Exporters National Association

The organization of exports is done with basis in a production and in a resource situation that has changed considerably since the organization took place. The four last

organizations therefore have less importance in today's fishing industry.

The fresh fish exporters (including salmon) do not have their own exporter organization, but are organized through the Norwegian Fresh Fish Sales National Association. Shrimp exporters and exporters of frozen fish do not have their own organizations.

9. PRODUCT STRUCTURE IN THE FISHING INDUSTRY

In the following sector the product composition in the fishing industry will be described. The volumes produced of the individual products can change over time. It is especially the resource situation at any time together with market conditions for the individual products that determine the product composition of the output from the industry. Processing methods used, and the product groups the industry is working with, have still shown great stability in the last 40 year period. The only really new products that have required any degree of technical and marketing innovation are breaded fish products (fish fingers) and machine peeled shrimps. Outside these the degree of processing and the use of technology are relatively low in the fishing industry. The most important product categories are classified as follows:

Salted fish (wet salted)
Stockfish (dried without salt)
Klippfish (salted and dried)
Frozen fish
Fresh round fish
Peeled shrimp

Within each of these product categories several fish species

are in most cases used as raw material. As an example we can mention that stockfish in 1983 was produced from 5 fish species: Cod including spawning cod (skrei), pollock, ling, cusk and haddock. Each product, for example klippfish of cod, is faced with a specific demand situation and is affected by competition from different substitute products. However, each product category is also affected to a large extent by the same factors so that the organization of information for evaluating market conditions become manageable. The degree of detail in the information to be presented has large consequences for the supply of information and the effort required to maintain the system. It is therefore important to find methods to group the products so that the work with the information is limited, and at the same time, make sure that the information is of relevance (p.47) to the users.

The product structure in the Norwegian fishing industry is shown in the following table. The products are here grouped according to the same patterns as the companies that produce and export them, and the organizations in the industry otherwise. The production of herring and herring products, sprats and mackerel for human consumption is not included in this summary. This production, that principally consists of herring - and mackerel products, comprised ca. 65,000 tonnes in 1984.

Table 5. Norwegian production in the period 1979-1984 according to utilization (in tonnes raw fish).

Year	1979	1980	1981	1983	1984	% of total
Utilization:						
Fresh	79354	50455	128873	54759	71932	18
Drying	53287	78884	171591	36789	27063	7
Salting	137782	113720	217335	117000	84575	21
Conv.proc. methods:	270423	234059	517662	208548	183570	46%
Freezing	221091	204248	339308	223600	219898	34%
Shrimp	33773	44810	40323	66600	83834	
Salmon/ trout	6833	7513	12907	22286	25936	

Source: Fiskets Gang 1980 - 1984

The table gives the distribution by volume of how fish was utilized. By value the production of salmon is especially important relative to the volume. The gross product of the Norwegian aquaculture industry was 1.2 billion kroner in 1985, or ca. 17 % of the total product value for the fishing industry , while the share by weight was only about 5%. In the group "salted fish", most of this is further processed into klippfisk (ca. 78%) and salt fillets (ca. 6%), while the rest is exported as (wet) salted fish (ca. 16%).

It can be seen from the table that in 1984 a total of 54% was used for the production of frozen fillets, 21% for salted fish including dried klippfisk, 7% for stockfish and 18% was utilized as fresh iced fish.

The distribution of the total production by species is shown in Table 6.

Table 6. Quantities caught of the most important species 1979-84 Gadoids etc. including shrimp.

Fish species/	Kvantum (tonn)					
Year	1979	1980	1981	1982	1983	1984
Cod	334635	281201	338882	340000	180570	183352
Haddock	73857	68101	66071	47000	17681	152224
Pollock	160082	176962	222183	220000	144916	161984
Cusk	31228	36968	30593	27000	17189	19165
Ling	30191	27189	23459	28000	14183	14792
Redfish	9173	8614	9461	10200	7932	13958
Wolffish	4129	3491	2966	2500	1928	1800
Dogfish	7314	5925	3940	4200	2147	1668
Shrimp	33773	44810	40970	49000	76360	83387

Source: Fiskets Gang 1985 and Brochmann and Josefsen 1984.

These fish species comprised 98% of the total Norwegian landings of cod-like (gadoid) species including shrimps in 1979-1982. The most important fish species both by quantity and value has in the whole period been cod which in 1984 comprised 37% of total landings. The other species are ranked as follows according to their share of total landings:

Pollock 33%
Shrimp 17%
Cusk 4%
Haddock 3%
Ling 3%
Redfish 3%
Dogfish and wolffish(ocean catfish) 1%

There are regional differences in which fish species are of greatest importance. The most important species in the three

northernmost counties are cod, shrimp and pollock in that (p.49) order. In the counties in western Norway the most important species are pollock, cod, ling and cusk.

The traditional species used for industrial production (meal and oil) are not included in this summary. Some of this raw material is used for human consumption. This applies especially to the species herring,, sprat and mackerel. In 1984 the following quantities of these species were used for food:

Herring	48963 tonnes
Sprat	8220 tonnes
Mackerel	38206 tonnes

10. MARKET STRUCTURE FOR NORWEGIAN SEAFOOD PRODUCTS (p.50)

In this part we will describe how the export of fish (seafood) products is distributed by country. We will stick with the product groups used above. The countries comprising the principal markets for Norwegian seafood products varies considerably from product group to product group. The market countries are economically far apart, ranging from highly industrialized countries to pure developing countries. The macro-economic and political conditions vary accordingly and this results in wide differences in buying power and trade impediments of various kinds. The cultural differences result in differences in food habits and therefore differences in the products demanded.

The eight most important markets for Norwegian seafood products are given in Table 7 below.

Table 7. The most important markets for Norwegian seafood products 1982 - 1984. (Values in mill.N kr).

	1982	1983	1984
USA	422	733	910
UK	809	825	777
Italy	498	506	571
Sweden	482	539	252
West Germany	347	393	492
France	347	393	492
Japan	229	329	401
Denmark	192	319	330

Source: Norsk Fiskerinæring (Norwegian Fishing Industry) 1985.

These eight markets imported close to 60% of total Norwegian seafood exports in 1984. All these markets are industrialized countries. However, the picture changes if we look at the individual product groups. The conventional products in particular are exported to some markets with weak (p.51) economies and unstable political climates. The distribution of exports of conventional (traditional) products are shown in table 8 below.

Tabell 8. Klippfisk.

	1979	1980	1981	1982	1983
Brasil	15852	15675	11814	15038	9774
Dom. Republic	4110	2061	2469	1183	2249
Øvr. Vest. India	2072	1727	2349	274	373
USA/Canada	719	386	402	366	494
Angola (Port Afrika)	3100	400	571		
Zaire	4376	2213	2174	1556	863
Kongo		2804	3194	3853	3472
Italia	5395	6059	5070	5196	5454
Spania	399	1441	1094	533	198
Portugal (S)	5570	0	5907	6250	6000
Vest-Tyskland	1004	1091	1134	905	810
Frankrike	5891	6408	6324	4520	3771
Jamaica (S)		2000	3359	4035	2789
Mexico	1201	1797	1235		
Venezuela	1229	866	874	1172	594
Argentina	1077	684	791	521	26
Madeira			1133	1022	790
Franske Antiller				1658	1844
Div. uspesifiserte	7259	6021	5886	4735	5284
Totalt	59254	51633	55780	52817	44785

(S) Sentraliserte salg.

Kilde: Eksportstatistikk fra Eksportutvalget for klippfisk og saltfisk.

Table 9. Stockfish (dried fish)
Total exports in tonnes by countries.

År	1979	1980	1981	1982	1983
Italia	4547	3825	3983	4272	3963
Sverige	513	233	609	563	523
Finland	128	95	143	142	155
BeNeLux	121	105	93	98	103
USA	142	109	100	115	105
Jugoslavia	241	27	20	20	74
Nigeria	15268	14849	23689	10388	9072
Vest-Tyskland	137	194	36	40	76
Kamerun	285	445	270	494	398
Benin (Dohmey)	1	837	0	0	0
Andre div.	1816	469	603	287	814
Total	23199	21188	29546	16419	15283

Table 10. Wet salted fish and salted fillets.
Total exports in tonnes by countries.

År	1979	1980	1981	1982	1983
Italia	7379	5688	4268	8264	7612
Portugal	-	-	-	-	3500
Frankrike	4102	1810	1909	2817	2815
Spania	2462	2461	2429	1656	1014
Hellas	2517	846	1698	1465	1280
Vest-Tyskland	1871	956	672	1177	839
Australia	132	117	186	191	234
Danmark	136	101	37	70	833
Sverige	97	95	87	65	110
Div. uspesifiserte	2	5	54	12	117
Totalt	18697	12079	11350	15717	18654

Source: Export Committee for klippfish and salted fish.
Kilde: Eksportutvalget for klippfisk og saltfisk.

A number of the most important markets for conventional products are countries in Africa and South America with weak economies and changeable economic conditions. More than 50% of the total exports of klippfisk in 1983 went to countries outside the industrialized part of the world. The principal market was Brazil which has experienced a continuing political crisis in recent years. The characteristics of most of the klippfish markets are economical stagnation, high and growing debt burden, negative trade balance and high inflation. The economic problems are often attempted to be solved with the help of currency restrictions that directly influence the exports to the individual countries. This type of intervention in foreign trade is also done in one of the most important European markets, Portugal.

These unstable conditions are the chief reasons for the large variations from year to year that can be seen in Table 8.

A similar distribution of the exports between industrialized and non-industrialized countries can be found for stockfish. Nigeria has long been the principal market with a peak reached in 1981 when the country took 80% of total Norwegian exports. Economic crises have several times led to a disappearance or a sharp reduction of exports to this market. Measures used are import bans, import quotas, maximum prices, duties and currency restrictions. Stockfish as a product is unique enough to prevent problems by selling to other markets.

Table 11 shows the exports of the product group "Fresh and round frozen fish and shellfish". Important products like salmon and shrimp also belong in this group.

Table 11. Total exports (tonnes) by markets 1984.
Fresh and round frozen fish and shellfish.

	UK	Sweden	France	USA	FRG	Denmark	Japan
Cod	146	39	190	-	85	277	-
Pollock	988	264	1118	784	4870	5993	109
Haddock	836	135	15	65	864	869	-
Ling	-	799	-	-	-	-	-
Redfish	108	102	456	-	3235	24	3028
Salmon	1743	1058	4453	4703	2647	2439	96
Shrimp, shell on	-	2385	33	57	40	158	3690
Shrimp, peeled	5022	3438	397	3551	513	2394	67
Other species	8843	1623	882	2210	2992	5018	1927
These species' part of total	89%	84%	88%	81%	80%	71%	79%

The markets listed in the table imported in 1984 a total of 76% of the Norwegian exports of this product group by weight. The principal markets are listed below ranked according to quantity imported:

West Germany (FRG)
Denmark
USA
U.K.
Sweden
Japan
France

The most important salmon market in 1984 was France; the most important market for peeled shrimp was the U.K.

The distribution of frozen fish exports on the seven (p.55) most important markets were as follows (numbers in brackets are quantities in 1000 tonnes)

United Kingdom	(367.0)
USA	(245.5)
West Germany	(117.6)
Finland	(92.2)
Sweden	(76.0)
France	(52.4)
Italy	(23.5)

Exports to these seven countries constituted 89% of the total frozen fish exports from Norway in 1983.

11. TARGET GROUPS FOR MARKET INFORMATION - PROPOSAL FOR GIVEN PRIORITY TO POTENTIAL USER GROUPS

As we have already pointed out several times, use of an information system is strongly dependent on to what degree the users' requirements have been considered in designing the system. Most of the experiences from development and implementation of EDP-based information systems come from private concerns where attempts were made to taylor make the system for the individual concern. Even under such conditions the experience has been that analyses of the user's requirements and conditions have not been carried out thoroughly enough. The result has been that the systems have not been accepted by the users. For an external information system, the practical use that the users have of the system will be even more decisive since the decision to use it will only be taken after a concrete evaluation of the finished system. If the system is to be offered on a subscription basis, the use will be subject to evaluation at frequent intervals, and

decisions regarding use will be easy to reverse.

In going through the corporate structure in the fishing industry , the number of units in each group was determined. The study showed that the processing plants were the numerically largest group with 1074 concerns. These were followed by food fish rearing units, vessels over 100 feet with 423, exporting concerns with 115 and public and private organizations (our selection) with 98.

As a basis one can choose between two strategies for formulating the information system. One can either attempt to develop a system where the information that is relevant for as many users as possible is given a high priority, or choose to give high priority to a user group and formulate the system as much as possible around the requirements of this group. The fishing industry is , as explained above, characterized by a clear division into three of the work tasks between the harvesting -, processing- and exporting sectors. The information requirements, and not the least the time allocation of the managers will therefore be different from sector to sector. The harvesting sector will be concerned about the choice of fishing grounds, fishing methods, getting the vessel ready etc. (p.57) These are circumstances that are chiefly decided by the raw material situation and institutional conditions. The sector is directly affected by market conditions, but the time management sets aside for independent market evaluations will be marginal for most.

The processing sector is as we have seen also to a large extent raw material - and processing oriented. Of vital importance for these is, however, product choice decisions that must be based on market information. It can be said that the processors in general are more closely tied to the markets than the harvesting sector. The harvesting sector is guaranteed sales for their products at a firm price through the Raw Fish Act and fishermen therefore do not have the same requirements to follow market developments. The processors must, however, make a choice

of products which for some products could be based on the market situation up to half a year in advance. The best possible composition of products could be determined from a correct evaluation of the market outlook for the individual products. Several other decisions would also have to be made based on market information. Processors meet a free price formation from the market prices attained on export markets, and are also therefore more directly affected by market conditions. The requirement for market information is therefore objectively higher for the processing sector than for the harvesting sector. However, the actual use of market information will not always be so extensive. A survey of the time used by leaders of fish processing concerns shows that relatively little time is set aside for administrative tasks. The market evaluations will often be limited to a quite passive approval of recommendations made by marketing cooperatives. The product choice is made on the basis of these recommendations and price offers for fresh fish from exporters in contact with the processor. More and more processors are now actively working to increase their market knowledge through fair visits and courses. This together with the trend that traditional processors to a larger extent are evaluating doing their own exports or through export associations mean that we consider processors as a possible user group for a market information system.

Fish farmers will not have the same need for market information as the processors. For most there is no problem in product selection. The fish are taken up, slaughtered and, if necessary, packaged according to instructions from the exporter. Three quality grades have been established for salmon in addition to seven size groups and the variants gutted/round and fresh/frozen. Up to now the markets for salmon been stable enough that the farmers have been able to select the time of slaughter and thereby the sizes and variants from growth conditions. When there are less favorable market conditions, to be expected from the sharp growth in production, the farmers must pay more

attention to seasonal swings in the demand by varying the time of slaughter. With market conditions as we have today, we can not see fish farmers as active users of market information beyond what they get from their organization, marketing cooperative and export contact.

The group that is the most active user of market information today is the exporters group. A large part of the decisions taken in an export concern is based on market information. This applies both to the short term, operative decisions regarding raw material purchases, allocation of the products between markets and customers, price setting, transportation arrangements, and also the long-term strategic decisions regarding choice of markets, choice of customer policies, choice of product spectrum and the long term customer - and supplier cultivation. The exporting concerns have their own staff that spend most of their resources on the raw material - and processing situations. Among businesses in the fishing industry,exporters have today the best developed market information system . Information on market conditions will be one of the most important resources of the company, and as a group the exporters are most dependent on following market developments. Exporting companies is the most obvious target group for an external market information system. It is also the group that has best access to market information and has the best qualifications for evaluating the quality of the information made available. They will therefore set (p.59) relatively high demands on the relevance and reliability of the information they are being offered.

With basis in the actual use of market information by the individual companies, and the setting of priorities as a basis for decisions relative to internal conditions and the raw material situation, we will still suggest that the exporters needs are primarily covered developing the system. This does not mean that processors and fish farmers are to be written off as users of the system. These can choose to follow the market situation in order to make independent decisions and as control

and supplement to the evaluations they get through exporter contacts and marketing cooperatives. Processors information needs will, however, not be more extensive than the exporters, and this will in most cases mean that an information system developed for exporting companies without further adjustments could cover the processors need for information. This applies to the type and amount of information. It is possible that the information should be sorted and organized especially with processors user interests in view.

12. SYSTEM ORIENTATION TOWARDS PRODUCT GROUPS

As we have discussed in an earlier section, the products exported by the fishing industry can be divided into groups. The concerns in the industry and the organization of the industry has a structure that is built up on the basis of these groups. Each group contains products that use several different species as raw material, but the market situation for the products within each group is to a relatively high degree dependent on the same factors. The products are also exported to the same groups of markets so that the information that is relevant for evaluating the markets for the individual products to a high degree will be the same for each product within each product group.

This has consequences for which strategy it is advisable to choose in formulating the system. As a basis one can choose between two strategies. One is to choose the information in relation to the individual species. This has advantages with respect to some processing data for competitor countries. Resource projections, advice from biologists, quotas and the actual quantities landed are given for each species in various source documents. These are factors that affect the market situation for Norwegian seafood products.

The other alternative is to organize the information in relation to the individual product groups. In this way the information can be better adapted to fit the needs of the individual users. These have a relatively high degree of specialization with respect to which product group they belong to. The market conditions will also to a larger degree be dependent on product groups than on fish species. The situation on the fresh fish market will for example in most cases be more dependent on the total supply of fresh fish than on the supply of frozen cod fillets or klippfish. The product choice decisions will also concern the uses of one specific species, and (p.61) not to the same extent the choice of fish species as raw material for a given product. We will therefore propose that the bulk of the current market information that is processed through the system be organized by product. The system will then be constructed with product groups as the main modules. The further distribution of the information can go on this product and be further broken down by individual fish species and markets.

In the summary over product groups we had entered "fresh fish" as a separate product group. This was done based on existing divisions between exporters where the fresh fish exporters to a large degree comprise a specialized group. For these companies the exports of fresh fish represent the main part of their business. This specialization is based on current export legislation where fresh fish overall is subject to one and the same regulation, and also on specifics in fresh fish exports. The market situation for fresh fish is special in relation to the other product groups, and special competence is required in the marketing of fresh fish. Salmon is included in this group. From the importance salmon has attained as an export product, it is natural to bring out information on salmon as a separate module in an information system. However, the users of this information will be the fresh fish exporters. Somewhat the same applies to herring. The demand for herring is to a relatively high degree independent of the demand for other species, be it fresh or

frozen products. The resource situation for herring is also promising and it is therefore expected that this species will become more important as an export product in the near future. It is in our opinion natural to introduce a separate module for herring in the system.

Based on this discussion the information will be organized according to the following principal modules:

Frozen fillets (p.62)
Salmon
Peeled shrimp
Salted fish (wet)
Dried fish (stockfish)
Klippfish (salted and dried)
Fresh fish
(Herring)

The information in each of these modules will be further divided in several dimensions, such as markets and fish species.

In addition to information on production and consumption of the individual product groups it is of importance to have an overview of the harvesting situation for the individual species. We therefore think it is natural that the system contains a separate module where resource projections for the individual species are presented. As subgroups, the information can be divided into each producing country. Also here it would be necessary to set priorities as to which species should be covered. Most fish species are substitutes to a greater or lesser degree and will therefore affect the market situation of each other. However, a systematic study of substitution relationships for Norwegian seafood products has not been carried out. It is therefore difficult to build into the system knowledge of substitution relationships. We find it natural that priority be

given originally to the fish and shellfish species most important for the Norwegian industry and then perhaps develop the system to apply to the most important substitutes following a study of substitution relationships.

We have above discussed the most important fish and shellfish species for the Norwegian seafood industry. The module for catch projections should according to this contain information on expected landings of the following species:

Cod
Pollock
Cold water shrimp (primarily Pandalus borealis).
Salmon (primarily Salmo salar)
Herring
Mackerel
Cusk
Haddock
Ling
Redfish

13. SYSTEM ORIENTATION TOWARDS MARKETS - GIVING PRIORITIES TO COUNTRIES

Norwegian seafood products are today exported to countries all over the world. Exports of salmon have contributed heavily to the internationalization since it is a high cost product that can bear the high costs of air freight. In total,Norwegian seafood products are exported to some 50 - 60 countries. To obtain information on macro - economic, political and market conditions in all these countries would be an unrealistically high objective. Choice of countries must be limited, and we suggest that the setting of priorities be based on two criteria. First it

is natural to choose countries that import Norwegian seafood products with a high total value. Some important markets will drop out if we use this criterium. These are markets that are important for single products, without that the total imports of all species ~~added~~ need to be among the highest. This applies to some of the markets for conventional products which should be watched especially on the basis of unstable economic and political conditions.

The most important markets for Norwegian seafood products have been discussed in an earlier section. Table 7 showed the eight most important markets by value of total exports. In addition to these, there are therefore also some countries that are important markets for single products. These countries should be monitored as markets. The most important competitor countries should, as mentioned, also be monitored with respect to expected production etc. We have not in this project studied which countries on a world basis produce the same fish and shellfish species as Norway. However, this information can be found in the yearly FAO books on fisheries statistics.

Countries that should be monitored with respect to market information and macro - economic and political conditions are as follows:

USA (p.65)
Great Britain
Italy
Sweden
West Germany
France
Japan
Denmark

The following countries are important markets for single products (in brackets):

Brazil (klippfisk)
Jamaica (klippfisk)
The Dominican Republic (klippfisk)
The French Antilles (klippfish)
Portugal (salted fish)
Spain (salted fish)
Greece (salted fish)

14. ROUGH OUTLINE OF THE INFORMATION SYSTEM - THE MARKET

In this section we will give a rough outline of how the information in the system could be organized based on priorities as to target groups, product groups and markets. We will in this section not discuss the qualitative aspects as to what information should be fed in. This will be discussed in the last section.The basic part of the system could, as we see it, constitute a part for current information on the marketing conditions on the individual markets. It is this part of the system that is described here. In addition, there could be separate modules with information on conditions that do not affect the markets directly but serve as practical information for the companies. We are here thinking of a pure database part with information that does not need the same degree of updating. Suggestions for elements in a database part will be presented later in the report.

From what has earlier been discussed with respect to product groups in the fishing industry, we propose the following main menu for the system:

------- MARKET INFORMATION FOR FISH AND SHELLFISH-MAIN MENU------

1. Fresh fish
2. Frozen fillets
3. Klippfisk
4. Salmon
5. Shrimp
6. Salted fish
7. Herring
8. Stockfish

CHOOSE A NUMBER 0_

****

As sub-menu for information on a single product group, one can choose if the information should be broken down by country (p.67) or by species. What is an appropriate presentation form for the information will depend on the decision situation. Sorting of information by species or by countries within each product group should therefore be optional. As discussed earlier, the individual product groups are being exported to various countries. There should therefore be sub-menus included for countries and fish species for each product group.How many countries and species the information is to be broken down into depends on the quantity distribution in principal markets and secondary markets, and also the mass of information available. If relatively little information is filed in each part, it is unnecessary to divide it into countries and species. It should also be considered that a further breakdown of the information into finer details can reduce the user-friendliness of the system. With this reservation we suggest the following sub-menus for the individual product groups:

----------SUB - MENUS FOR FRESH FISH----------

1. Denmark
2. France
3. Japan
4. Great Britain
5. Sweden
6. West Germany
7. USA

CHOOSE A NUMBER 0_

****

----------SUB - MENU SHRIMP - COUNTRY----------(p.68)

1. Denmark
2. Great Britain
3. Sweden
4. West Germany
5. USA

CHOOSE A NUMBER 0_

****

----------SUB - MENU FROZEN FISH - COUNTRY----------

1. Finland
2. France
3. Italy
4. Great Britain
5. Swe len
6. West Germany
7. USA

CHOOSE A NUMBER 0_

****

----------SUB - MENU SALTED FISH - COUNTRY----------

1. France
2. Greece
3. Italy
4. Portugal
5. Spain
6. West Germany

CHOOSE A NUMBER 0_

****

----------SUB - MENU STOCKFISH - COUNTRY--------- (p.69)

1. Italy
2. Nigeria

CHOOSE A NUMBER 0_

****

----------SUB - MENU SALMON - COUNTRY----------

1. Denmark
2. France
3. Great Britain
4. Sweden
5. West Germany
6. USA

CHOOSE A NUMBER 0_

****

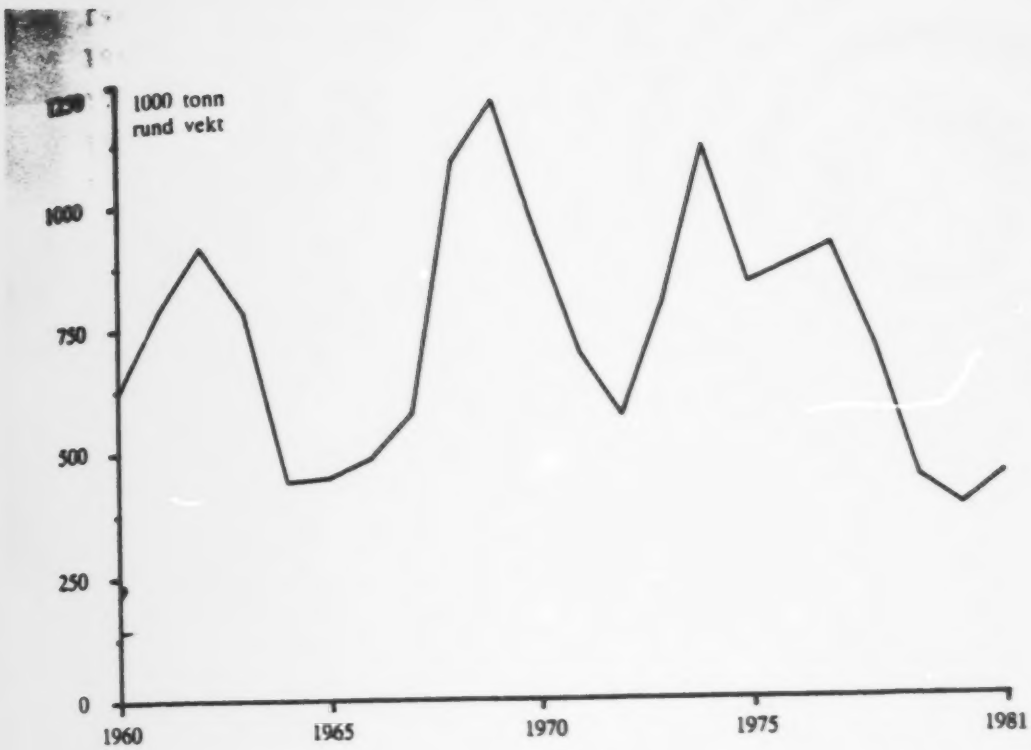
This menu suggestion is made with basis in the existing market structure for Norwegian seafood products. The market structure is always in a certain state of flux as old markets become less important and new markets are opened. Changes in the

resource can have similar effects on the market structure. Which countries that should be covered should therefore be subject to evaluation yearly, based on export statistics.

In addition to breaking down the information by country, it would be relevant to have the information broken down by species. The market development for each species within each product group is not identical, and decisions can not be taken on the basis of aggregated information on a whole product group. The (p.70) division of information can then be made the same way as for countries where the information is sorted by the most important species within each product group. The same reservations apply to these sub - menus regarding information flow as for the distribution by country. The condition for breaking this information down into more detail is that sources of information are available to make such division possible.

15. ROUGH OUTLINE OF THE INFORMATION SYSTEM - THE RESOURCE PART

As stated in section 12, a total overview of the resource situation for important fish species will give a picture of the competitive conditions that Norwegian seafood will encounter in the various markets. We will here outline how we imagine the resource situation should be organized in the system. A discussion of what information should be included, presentation and sources will be presented in a later section. The supply of seafood will at any time be strongly dependent of the resource base for the individual fish species. Landed quantity will be dependent also on other factors, such as harvesting capacity and variations in availability (weather - and ice conditions, variations in migration patterns), but the resource situation will for most fisheries be the most important single factor. Figure 3 illustrates how the landings vary from year to year for Norwegian arctic cod.



Figur 3. Totalbeskatning av norsk-arktisk torsk 1960-1981.

Figure 3. Total exploitation of Norwegian - arctic cod 1960-1981

We can see that landings have fluctuated from near 1,200,000 tonnes in 1969 to 382,000 tonnes in 1980. Landings have therefore

fluctuated by a factor of three, and this is of course of great importance for market conditions both for cod and for other species.

In association with the resource situation there are three key factors that affect the supply of the individual species: Resource projections, establishment of stock sizes and setting of catch quotas. Resource projections are made by biologists from countries that exploit the stocks. Most commercially exploited fish stocks are common stocks where several countries have the right to fish the same stock. Resource projections are then made in committees by biologists from the individual countries (for example ICES). The resource projections are made for 5 - year periods and updated each year on the basis of cruise results. The projections are considered to be somewhat uncertain but are the best estimate for future production available and an important basis for long term strategic decisions in each sector of the fishing industry.

The stock estimates are set for one year at a time, with updating in the middle of the period for some species. The stock estimates are in turn the basis for the advice given by biologists to political authorities in each country. This advice forms the basis for setting next year's catch quotas.

Catch quotas are the most accurate estimate available for next year's production of the various species. The quotas can in some cases be overfished or not filled, but most countries have control systems to enforce quotas, and the next year's quotas will usually give a good indication of landed quantities.

Projections will be available broken down into species and stocks. The quotas for each country are normally set at the beginning of each year after negotiations between fishing (p.73) nations and between biologists, political authorities and trade organizations so that the catch projections cannot be broken down by country just like that. In cases where the distribution of the total catch between countries is relatively stable, historical values could possibly be used as a distribution key. However, for

many species each country does not have a fixed part of the total catch. To illustrate this we refer to Table 12.

Table 12. Norwegian-arctic cod. Total exploitation and distribution by the most important countries. 1976-81.

År	Norge	Sovjet	U.K.	Totalt
1960	232	213	141	622
1961	268	326	158	783
1962	226	477	175	909
1963	205	418	130	776
1964	150	181	95	438
1965	197	153	90	445
1966	204	169	103	484
1967	219	262	87	573
1968	256	677	140	1074
1969	305	612	231	1197
1970	378	277	181	933
1971	407	145	80	689
1972	394	97	58	565
1973	285	387	79	793
1974	387	541	91	1102
1975	277	344	102	829
1976	345	344	89	867
1977	389	370	87	905
1978	363	267	35	699
1979	295	106	18	440
1980	230	115	10	382
1981	283	127	5	445

Source: Fisken og Havet. Resource projections. Institute of Marine Research (1982).

The table shows that the Soviet part of the total catch in the period has varied from 17% (in 1972) to 63% (in 1968). One reason for the variations is connected with the migration pattern of the cod.

The resource projections and the recommendations for total catches (TAC), will similarly be available for the individual stocks. The information can therefore be presented by species and by stock, but not directly as expected production from each link.

The quotas are distributed to each country and when these are available, they can be presented broken down by stock, species and harvesting nation. Information on catches by nation is in our opinion of relatively high value. Based on the processing structure and market structure of each individual country, quite detailed information on expected supplies of the various product groups to each individual market can be given.

Based on this we will suggest the following main menu for the resource part of the system:

--------RESOURCE INFORMATION FOR FISH AND SHELLFISH-MAIN MENU----

1. Resource projections
2. Stock estimates with advice on catches (TAC)
3. Catch quotas
4. Utilization

CHOOSE A NUMBER 0_

****

The information on resource projections is first broken down by species where information on fish and shellfish species of importance for Norwegian fisheries is presented. These species are discussed in section 12.

These species only cover what is being caught/landed within the Norwegian fishing industry. Many of these have obvious (p.75)

substitutes that in many cases are landed in large quantities by other fishing nations and which clearly will affect the marketing conditions for Norwegian seafood. In this project we have not done a study of substitutes (for example Oregon shrimps to Pandalus borealis, Alaska Pollock to pollock (saithe, Boston Bluefish), Pacific salmon and seawater reared rainbow trout to Salmo salar) that should be included in a module for resource projections. As a sub - menu for the resource projection the following is suggested:

----SUB - MENU RESOURCE PROJECTIONS - FISH AND SHELLFISH SPECIES-

1. Cod
2. Pollock
3. Shrimp (Pandalus borealis)
4. Salmo salar (Atlantic salmon)
5. Salmo gairdneri (trout)
6. Herring
7. Mackerel
8. Cusk
9. Ling
10. Haddock
11. Redfish (Ocean perch)

CHOOSE A NUMBER 0_

****

Raw data for a resource information system will be available for each stock. From knowledge of which countries are fishing each stock, conclusions can be drawn with respect to which products will be offered and which markets these products will be offered to. It will therefore be of interest to present the resource projections for the individual stocks. We therefore suggest that the information for each species be presented collectively totalled up, and then be distributed on the

individual stocks.

The stock estimates and catch advice will be presented in the same way as the resource projections, divided by species and stocks. The information will be indicative for next years quotas, which will be a more exact estimate of production.

The purpose of including catch advice from biologists is that these in most cases are available earlier than the quotas. The module could be erased when quota distributions are available.

Information on quotas will, for the species they are available for, be given for the individual species and for the individual fishing nations.

16. RESULTS OF A SURVEY

As mentioned in the introduction, a questionnaire was sent out to survey requirements, sources and attitudes to market information. It was attempted to shape the study so that indications of market orientation in company managements would also come out, which key factors that affect the markets for individual products, the companies own evaluation of availability of market information of various categories and their knowledge of existing EDP - based information systems. The study also was designed find out what information systems were used by the companies at the present time.

1. Selection and response percentage.

The questionnaire was sent to 176 fish processing companies, exporting organizations and other organizations. The selection was made from Director General's register over approved processing plants for fish and fish (and shellfish) products, Norwegian Fresh Fish Marketing Organization list of members, Norwegian

Klippfish Exporters National Association, Norwegian Stockfish Exporters National Association and Norwegian Salt Fish Exporters National Association lists of member companies, and the Norwegian Fish Farmers National Associations list over establishments with buying permits for salmon.

The selection was made so that in the beginning there was a numerically balanced distribution by the individual product categories in addition to geographical coverage.

Of 176 questionnaires sent out, a total of 54 replies were received, i.e. a reply percentage of 54 which is not especially high nor especially low taking into consideration that the completion of the form was quite demanding (many open questions), and considering that no reminder was sent out. A copy of the questionnaire is shown in Appendix 1.

The results from the study is presented as follows. (p.78)

2. The importance of market conditions for the fishing industry.

The companies were asked which external factors were most important for their operation. This question was asked based on the current situation and from an evaluation of the next 10 year period. The fishing industry is known to be processing oriented, and the purpose of this question was to give an indication of to what extent the companies perceive market conditions as decisive for the existence and success of the company. Five alternative replies were chosen based on knowledge of the important basic conditions in the fishing industry.

Table 13 shows which factors were rated first and second according to principal products of the company. The factors that were weighted after these two are not relevant due to the distribution of replies. The numbers give the approximate rating of the factors.

Table 13. Rating of basic conditions by the processing industry.

Type of plant	Fresh fish	Shrimp	Convent.	Filleting
Current factors:				
Raw material supply	1.33	1.6	1.33	1.11
Market conditions	1.85	2.2	1.9	2.06
Factors next 10 yr.per.:				
Raw material supply	1.73	1.6	1.5	1.47
Market conditions	1.6	1.8	1.8	1.76
	n=15	n=5	n=10	n=18

The table shows that all plant categories evaluate the raw material supply as the single factor of greatest importance for the company. Similarly, the markets for seafood products (p.79) are rated as number 2, with the exception of the fresh fish processors and/or exporters that for the upcoming 10 year period has rated the market conditions as most important. The fresh fish processors also indicate a distinct difference between short- and long term outlooks. This can partly be due to the raw material situation and the market situation for salmon. One of the principal products for the fresh fish sector is salmon, and while at the present time there is raw material shortages and good demand for salmon, there is considerable uncertainty on how markets will react to increased production in the future. From this material we could not say that there are clear differences between the groups. Most of the companies had the same ratings. The small differences between the orientation in the long and short term can be due to the fact that all product categories except the shrimp sector have gone through a period with poor resources. The outlook for better resources will naturally turn the outlook from the raw material supply towards the markets. The conclusion to be made about these replies is still that the

respondents are concerned about market conditions and consider the marketing side as an important condition for their operation.

3. Access to market information by the companies.

The companies were furthermore asked to comment on their own access to market information at the present time. The respondents were given five alternate replies. The answers give quite a subjective evaluation of the flow of information as the questions and answers are formulated which is not necessarily a measure of the amount of information the company actually receives, processes and makes decisions on the basis of. The formulation of questions was chosen to give an indication of to what degree the companies were satisfied with the information flow that is available to them at the present time. Table 14 shows how the various types of companies perceive their access to market information. The companies are here divided according to principal products.

(p.80)

Table 14. Evaluation of the access to market information (% answers).

Type of processing	Fresh fish	Shrimp	Convent.	Filleting
Replies:				
Good	20%	20%	30%	12%
Satisfactory	53%	40%	60%	41%
Not so good	27%	40%	10%	47%

The table shows that the main bulk of the plants consider their access to information as satisfactory. There is still a large group that considers the access as not so good. We especially noted the large number of filleting plants that

apparently is dissatisfied with the current information situation. This is perhaps due to the marketing system that means that the marketing function is delegated to central marketing organizations (cooperatives).

If we group the results according to if the company itself exports their products, the replies show a clear difference in their view of their access to information. A total of 64% of the plants that do not export themselves assessed the supply of information as not so good, while there among the exporting plants were only 15% that assessed the supply as not so good. The others judged the supply of information as being good or satisfactory with the majority voting for satisfactory.

4. Factors affecting market conditions

The next question was asked to survey which factors the plants meant was of importance for the market situation for their products. This was done to identify some key factors that the system should be able to disseminate information on. The question was open ended so not to limit reply alternatives. This form of questioning makes it more difficult to group the answers, but is necessary when all relevant reply alternatives are not known in advance. Some of the respondents have clearly interpreted (p.81) the questions quite differently from what we intended. Therefore, the answers we present are conditions in the markets and not the respondents adaptation to the market, or basic conditions for adaptation to the market, as many interpreted the question.

The answers were formulated in several different ways, but we have grouped them according to the conditions they refer to. The results are shown in Table 15.

Table 15. Principal factors that affect the markets for seafood products.

Factor:	No. of answers
Foreign exchange conditions	9
Import restrictions incl. duties	12
Changes in demand, not specified	4
" " purchasing power	3
" " economic conditions	2
" " substitution/diets	3
Competition from other nations	20
" " Norwegian exporters	5

The factors are too many to make it possible to divide the answers up on product groups, but in general the conventional plants placed more emphasis on exchange conditions and import restrictions, and the fresh fish processors placed high emphasis on offers by the competitors. This is of course dependent on which markets the individual products are exported to and the economic conditions there. Any unambiguous differences in which factors emphasized by the groups could , however, not be uncovered by the material. It can be seen that the factors listed by the respondents are very aggregated. Foreign currency conditions, demand, competition and trade restrictions are the result of economic, resource-biological and social conditions, and it would be just as interesting, and in many cases necessary, to give information on conditions that affect these aggregated key factors.

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5. Decision areas supported by market information.

Information has no value in itself. It only becomes valuable when it is used as a basis for decisions, and when it leads to the quality of the decisions being improved relative to meeting an objective. The next question was posed in order to survey decision areas where management in the seafood industry makes use of market information. The respondents were asked to mention five areas of work that already were, or should be, supported by market information. The question was posed partly in order to enable the respondents to contribute information that would be relevant for the individual decision areas. Many of the seafood processing concerns have little experience in evaluating market conditions and have for that reason a quite simple picture of what affects conditions such as offers by other countries, reactions by market countries with respect to trade barriers, changes in demand etc.

The question was also asked in part because corporate structure, division of labor between the individual links, the length of the distribution channels, market shares and the formal competence of the management means that many of the market related activities found in other industries, and which an information system is usually organized to support, are not performed in the seafood industry.

As in the survey of key factors, the questions were also here posed without reply alternatives. The results are summarized in Table 16.

Table 16. Decision areas supported by market information. (p.83)

Decision area	Number of replies
Product choice	16
Price setting	5
Product development	5
Evaluation of new markets/products/buyer groups	4
Product specification	6
Raw material purchase	3
Marketing measures	2
Long term planning, transportation planning, storage ,cultivation of suppliers	1

It can be seen that the most common decision area according to this survey seems to be product selection. The raw material supply is often fixed in the seafood industry, and raw material is the limiting factor in processing. Each plant usually has equipment to produce several products. The markets for these products can change independently of each other; for example, there would be little connection between the market for klippfish in Brazil and the fresh fish market in Europe. Information on price- and market conditions for the individual products will then be one of the key factors used by company management to make a decision on which product the bulk of the raw material should be channeled into, be it fresh ,salted, dried or fillets. The decision on raw material purchases will be based on much of the same information as product choice. This decision area will also become more important if the resource situation improves for important species like cod and herring. In accordance with the decision typology discussed in the first section, decisions on product choices and raw material purchases could be both operative and tactical. Packing of fresh fish ties up the plant resources only from day to day with respect to the processing itself. The other products have longer processing times

(stockfish from 3 to 6 months), and therefore require both a more long term evaluation and a more in depth evaluation with respect to risk reduction for the processors. Choice of products (p.84) is more than the daily distribution of raw materials to various end products. Choice of product is also a strategic choice that has consequences for which contacts outside the company that should be cultivated. If a plant decides to let a part of the production be marketed as fresh fish, this requires building up and maintaining a contact net either with Norwegian exporters or with exporters in the markets. This is a long term task that requires information on individual plants and markets. Product selection will also be of importance for the company choice of raw material suppliers and will force the company to put pressure on the suppliers to chose harvesting methods that produce raw material of a quality that corresponds to the products that are produced. Product selection will also lead to decisions on investments, competence buildup and information system.

Price setting was given by some companies as a decision area supported by market information. In seafood exports this is a typical operative decision. The products that are exported are to a high degree bulk products that meet competition from other processors and other countries. The products are economically homogeneous, and each individual processor or exporter has a small part of the total market. The market power is therefore very small, and the processors have no special opportunity to affect the price level or to follow an independent pricing policy to reach strategic goals. Long term supply agreements with firm prices are not common either for most products, and the price is normally re-negotiated for each lot sold. The price setting is done from day to day, and the information that pricing is based on is typically short term and must be updated continuously.

Two other decision areas that are supported by market information is product development and evaluation of new market, product and buyer group combinations. These are decisions of a strategic character that is based on information on structures

and trends in diet compositions, buying power, (p.85) distribution etc.for the individual markets. A surveillance of technological innovation and competitors product development will furthermore give ideas for where efforts should be directed.

Planning marketing measures is one of the most important areas where other industries usually depend on market information.

This decision area was only mentioned by two companies and reflects the low effort placed on cultivating the markets by the private companies in the seafood industry.

Six of the respondents use market information for product specification. This applies to the demands by individual markets for quality, size sorting, package size and shipping package size.

6. Company sources of market information.

An external market information service must to a certain degree be developed in relation to the users existing information system. This must be done to avoid overlapping, and also because an EDP -based system not necessarily is suitable for transferring any form of information better than other media. The companies were asked to give their four most important sources of market information at the present time. The answers are grouped and are given in Table 17.

Table 17. The most important sources of market information.

Source:	No. of answers
Conversation with customers	38
Conversation with colleagues	14
Trade organizations	6
Marketing organizations	9
Travel/fairs	10
Export committees/Export Council	14
Trade publications/mass media	22
Statistics	8
Special reports	3

It can be seen that the most important source of market information is contact with other participants in the market. Another important group of information sources is information that is made available through pure service organizations such as sector or trade organizations, export committees and the Norwegian Export Council. Trade journals and other mass media are given as a common source of information, but relatively few of the respondents claimed that they use statistics or special reports as sources for market information.

We note that verbal transfer of information dominate strongly as a medium. Customers, exporters and processor colleagues, sector trade organizations, marketing organizations, travel and fairs are the sources where the information transfer take place verbally. This can be due to a preference among the users for verbal information since this involves relatively easy communication, little interference in the form of irrelevant information that must be analyzed to find the bits of information that are relevant in a given situation, and also transfer of opinions from colleagues that can either be used as such or serve as a basis for evaluations and decisions by the managers. The strong dominance for verbal communication can also be due to lack of information in other forms. Information on factors that

affect the market conditions for seafood is spread over many sources, and not all of these are available for each market participant. The verbal information network between the (p.87) market participants can be seen as a central where each participant contributes information from the sources he has available through his own information system, and where he in return has access to information from other information systems connected to other sources not available to himself.

These sources are often in themselves personal contacts that have been cultivated over a long period.

7. The type of information the companies have access to.

The companies were asked to list the information they have best access to at the present time. The question was asked to find out the type of market conditions the companies lack information about. Eight alternative answers were given and the companies were to rate the alternatives according to how well they are covered by information. In interpreting the results it is important to know that the replies were chosen based on our assessment of conditions that affect the markets on the long and short term. It is not necessarily a relationship between these factors and the market models that the companies use themselves. We attempted to take this into consideration by introducing a column for "other conditions". Very few companies made use of this, which could be taken as an indication that the most important conditions are covered by the reply alternatives. The rating still does not mean that a condition given a low score necessarily is an area that one ought to concentrate on in order to obtain more information. A low score can just mean that the companies interpret the condition as without importance for the market for their products. This is then a subjective assessment that indicates that the market models the companies use are quite short sighted and superficial. They will still be a consequence

of the managers view of what is important and what is not important for his concern, and thereby affect which form of information he will request in actual practice. The (p.88) replies to this question are given in Table 18.

Table 18. Areas that are covered by market information today.

Factor:	Rank (ave)
Prices	1.1
Landings	2.0
Competition from other countries	2.4
Economic climate and trade policies	3.3
Consumption pattern	3.9
Changes in consumption pattern	4.1
Demography	4.8

The table shows that the companies have good access to information on market prices for the products they produce and/or export. The same applies to information on the landings in market countries and competition from other exporting countries. We believe that most of the information the companies receive on these conditions are short term communication of the current situation. This is information that is relatively easily available through contact with the market participants. The prices are obtained indirectly through negotiations with the customers. The customers for Norwegian seafood exports are likely to be large international import companies that daily are in contact with exporters from a number of countries that produce the various products. The importers are thereby given information on landings in other countries and transmit these during the negotiations with the Norwegian exporters. Some of the information that flows to the exporters will in the next instance be conveyed to the processors through negotiations and conversations between exporters and processors. This applies to information on present conditions regarding landings and competition. With respect to projections and other conditions,

our opinion that the companies have less access to information. An overall picture of the production of individual species in the medium to long term will make the plants better able to plan processing, product selection, product development, (p.89) assessment of new markets etc. relative to an anticipated market situation that will fluctuate as supplies of the product are changing. The time frame being operated with in the evaluation of the markets can often seem short in the fishing industry. The results from Table 15 on principal factors that affect the markets, and the orientation on information flow as shown in Table 18 can be taken as an indication of this. A short planning horizon has again connection with leadership style and competence as shown in the third section of this report. A relatively low formal competence level, and little effort placed on administrative tasks (including planning), explains why the company management concentrates their attention on daily tasks, while the long term planning suffers. It is therefore somewhat uncertain based on this if long term information really is in short supply, or if it is considered to be unimportant relative to the work done by management.

8. Short - and long term market information, demand vs. access.

The companies were asked what they had most demand for, and what they had best access to at the present time; short term or long term information. The question was asked so that we could get more information if the limited assessment horizon regarding market conditions were due to management orientation or if it was due to lack of long term market information. What information was requested will also have large consequences for constructing the information system, both with respect to organizing the information system and which sources the system has available as input.

Table 19a shows average priorities of short term and long term information as most important (1 = most important, 2 = second most important) for each type of business. Table 19b shows which type information, long term or short term that the (p.90) same companies have best access to today.

Table 19a. Demand for information: Short term / long term.

Type of business	Fresh fish	Shrimp	Convent.	Fillets
Type of information:				
Short term	1.36	1.40	1.2	1.44
Long term	1.43	1.20	1.70	1.44

Table 19b. Access to information: Short term / long term.

Type of business	Fresh fish	Shrimp	Convent.	Fillets
Type of information:				
Short term	1.08	1.00	1.00	1.12
Long term	1.92	1.60	1.80	1.76

The sum of the averages for each type of business would have been =3 if the ratings had been unambiguous from each respondent. However, several companies had give short term and long term information the same rating. This does not present any serious problems in interpretation. A careful interpretation of Table 19a is that there are certain differences between the companies demand for short term and long term information. The business categories "Fresh fish" and "Conventional" all stated on the average that the demand for short term information was greater than for long term (Note: The original report has "short term" here;this must be a typing error. Translators note) information. The difference was most noticeable for the conventional companies. That the conventional plants placed most emphasis on information on short term changes in market conditions was somewhat surprising based on the time it takes from the product decision is made and to a sale is made in this type of business.

The result is a little difficult to interpret because there can be differences between company groups in what is considered to be long term and short term information. We believe that the conventicnal plants normally have somewhat longer time horizon than the fresh fish plants. Short term can for the (p.91) conventional plants mean 1 year, or one production cycle, while it for the fresh fish producing plants can mean as short as one day. A part of the explanation can also be that the conventional plants through their information system today have best access to long term information adapted to the requirements of conventional production. The product choice situation they are faced with is often conventional or fresh fish processing, and the companies therefore lack information on short term changes in the fresh fish markets. In this limited project we have not been able to go back to the respondents to get a further clarification of these conditions. What we interpret as interesting in the replies is that there are relatively small differences in what information the companies claim they have a demand for. This gives greater freedom with respect to the construction of the system and means that priorities can be established according to the sources that are available. This is of considerable importance because in practice there will be large problems in having the system record and transmit information on the short term swings in the market situation for the individual products.

Table 19b is more unambiguous in its results. It shows that the companies have clearly a better access to short term market information than to long term. This applies to all company categories. The shrimp plants seem to have best access to long term information. However, we will be cautious in interpreting differences between plant types as the interpretation of the concepts long term or short term can be different based on the principal products produced by the plant.

By comparing the results from the two tables, there is an indication that there is a demand for market information of a more long term character that is not being met. The companies

have good access to short term information, but they also evaluate long term information as important.

9. The contents of the database. (p.92)

Our idea of the market information service is that it will consist of two quite clearly separate parts: One system part for continuous market information that registers and transmits information on more short term changes in market conditions and factors that will affect the market conditions, and a database that can contain practical information on the individual markets of more lasting character. The companies were asked to rate which type information they thought a database like this should contain. Seven alternative replies were given. These were chosen based on our knowledge of relevant and available market information of a more lasting character. We do not, of course, have perfect knowledge of which information is relevant for the individual users, and an attempt was made to take this into consideration by having a column "other". The results from surveying actual contents of a database are given in Table 20. We will add that the column "other" was used very little, and that possible contents in a database are not limited to these seven factors.

Table 20. Company priorities of the contents of a database.

Factor	Ave.priority
Register of importers	2.54
Consumption by product:	
Fresh/frozen/processed	2.55
Quality norms	2.83
Consumption by species	2.95
Customs duties/trade barriers	3.62
Consumption segments:	
Home/restaurant/institution	4.75
Geographic variations in consumption	5.05

The table indicates a ranking according to the alternative replies given. However, the spread was large depending on which data the companies seemed to give priority to. The data base is again too weak to enable us to go further and analyze the (p.93) priorities relative to the individual groups of companies. We have, however, calculated which factor that received most first priorities, and most last priorities. This gave the same ranking as above where an importer register was ranked as number one by 52% of the companies, while 40% ranked geographic variations in the consumption of seafood as last.

10. Possible use of an external market information system.

The companies were asked some questions in connection with possible use of a market information service. The questions were asked to find out to which degree the companies saw themselves as possible users. The answers will probably be closely associated with the conception the companies have on which information that is being made available through such service. From our experience we will here urge that the interpretation of the replies be made with caution. Few of those we contacted had any concrete opinion of what an EDP-based market information system is. We believe that so far there are some unrealistic expectations with respect to which information could be accessed from such a system, and also to what extent the system can function as decision support. Such expectations can give rise to positive replies that are really not really true and that will not be realized in the adaption of the system.

The companies were first asked if they were possible users of a market information service. The distribution of replies according to type of company is given in Table 21.

Table 21. Distribution of possible users.

Type of business	Fresh fish	Shrimp	Convent.	Fillets
Possible users	80%	100%	50%	56%
Non-users	7%	0%	30%	22%

"Don't know" was not given as an alternative answer, (p.94) but some of the companies gave this answer on their own initiative. Even if all the plant categories apparently look at themselves as possible users of a market information service, it is obvious that they all set certain conditions. Implied are the conditions we discussed in the two first sections of the report that the system give information that is adapted to the requirements of the individual concerns.

As a sub-question we further asked which information, short term or long term, the companies would request. The respondents were asked to cross off both squares if this was relevant. The replies apply of course only to concerns that saw themselves as possible users of such a system. The distribution of replies is given in Table 22.

Table 22. Demand for information: Long term/short term

Type of business/plant	Fresh fish	Shrimp	Convent.	Filleting
Short term	1.17	1.00	1.00	1.13
Long term	1.23	1.00	1.67	1.53

It can be seen that the fresh fish- and shrimp processing companies according to this seem to demand long term and short term information to the same degree. The conventional processors (salted, dried) and the filleting industry clearly give priority to the short term information. We believe that the reason for this is that the information systems of the companies are

directed towards the principal products being marketed at the present time. Conventional companies and filleting plants will therefore have best access to information of a more long term character.

The processors were further asked in this study about what they considered to be a reasonable cost for relevant and reliable market information through such a system. Five alternative replies were given ranging from <kr. 5000 /year to >kr. 100,000/yr. The results are given in Table 23.

Table 23. Reasonable costs for market information.

Costs	Percentage of processors/comp.
<5000 N. kroner	17%
5000 "	28%
25,000 "	36%
50,000 "	17%
100,000 "	2%
>100,000 "	0

It can be seen that most of the companies consider a reasonable cost to be between kr. 5000,- and kr. 50,000,-. Which costs that are given will again be dependent on which expectations the processors have to an information system.

12. Knowledge of existing market information system.

There is today 2 EDP - based market information systems for the fishing industry in operation. These are the FAO Globefish and the private British system FISHNET. In addition there are at least four systems that are based on dissemination via printed marketing bulletins: The American SEANET and SHRIMPNET and the

EUROPEAN SUPPLIES BULLETIN and EUROFISH REPORT. Of these, work is underway to make SEANET EDP - based. In addition there is the FAO INFOFISH TRADE NEWS which is a module in the GLOBEFISH system. We will survey the processing companies about their knowledge of these systems, the extent of use and on possible experiences from evaluation and use.

The companies were asked if they subscribed to any of the existing information systems. Those that replied yes were then asked what use they had from the system. Those that replied no were asked why they did not subscribe. Table 23a shows the percentage of the respondents that subscribed to the existing market information systems.

Table 23a. Use of external market information systems. (p.96)

Use	Percentage of companies
Subscribes	21%
Does not subscribe	79%

Those of the companies that did not subscribe to any of the systems were asked to give the reason for this. Four alternative answers were given, and Table 24 shows the distribution of replies.

Table 24. The reason for non-use of information system.

Reason	Perc. of companies
Info. not relevant to our activities	26%
Info. poorer than that we have access to	3%
System is too expensive	0%
Does not know the system	71%

Those of the respondents that currently subscribe to one of the existing information systems were asked to give their assessment of what use they have had of the information. Three reply alternatives were given, and the results are shown in Table 25.

Table 25. Experiences in the use of external information systems.

Usefulness of information	Percent.of companies
Very useful	30%
Useful	60%
Not very useful	10%

It can be seen that a large number of the companies in fact do not know the existing information systems for seafood markets. Of those that have evaluated the systems and decided not to subscribe, the reason for most of them is that the information is not considered to be relevant for their activities. A total of 90% of the users (in all 9 companies) claimed to find the systems useful or very useful. This can indicate that there is a certain potential in going out to the user groups with presentation of the systems.

17. ORGANIZATION OF INFORMATION IN OTHER EXTERNAL SYSTEMS

An important source of information to be included in the system will be the existing external information systems. These include for example the EDP - based systems GLOBEFISH, FISHNET and SEANET (not yet EDP - based) that are especially aimed at seafood markets, and the printed information systems like EUROFISH REPORT, SHRIMPNET, INFOFISH TRADE NEWS, EUROPEAN

SUPPLIES BULLETIN, ERKINS SEAFOOD LETTER etc. The larger seafood trade journals will furthermore be used as an important source of information for the system. One of the main points of having a separate Norwegian system is that one takes aim at organizing the information according to the specific demands of the Norwegian seafood industry. The information is organized according to Norwegian export products, Norwegian markets and consideration is given to Norwegian corporate structures and the management considerations that applies to Norwegian seafood companies. The existing systems are built up to cover the information requirements for the seafood industries in other countries, and this is reflected in the choice of information. For a Norwegian user this will be reflected in that only a part of the information is relevant for him. The systems will therefore be considered to be difficult to follow, and it takes a long time to find the information that is relevant.

A description of how these systems are organized is still useful to get ideas on how the information can be organized, and as a basis for evaluating the systems as sources for a Norwegian system. In the following we will therefore go through the organization of the most important information systems in operation today.

1. FISHNET

FISHNET is an EDP - based system that chiefly deals with landing data and first hand prices for fresh fish. The system is developed and operated by AGB Cable and Viewdata Company, London. The system is built up around some important fishing ports (p.99) in Europe where routines have been established for registering auction prices and quantities sold per day. The information is called in to the system from a network of correspondents that register the data in the individual ports. The system is the only one in operation today that can disseminate close to "real time" supply - and price information for the fresh fish sector.

The information is organized as follows:

Module 1: Landings by fishing port and species.
Module 2: Prices by fishing port and species.
Module 3: Projections for landings by fishing port and species.
Module 4: Price and landings statistics for current month, and 6 months statistical review.
Module 5: T[illegible]deline, where companies call in offers and inquiries that are entered into the system the same day.

The system contains information on 43 fish and shellfish species where all Norwegian species of current interest are included, and registers data from 23 ports and a wholesale market (Billingsgate/London).

Module 3 with projections for landings for the next day and for the next week is not operational in its current form since registrations of landings are insufficient.

Module 5 with offers and inquiries from companies have not been much used so far. Last time we checked into the system the module contained 11 companies.

The prices can be converted directly to most (p.100) European currencies. The rates are being updated each day, and the users can get price information directly in any currency he wishes through a choice of menus. Quantities are converted to metric units or pounds according to choice.

We have not made a thorough analysis of the system, but our principal objection is that the system is limited to ports that have well developed routines for registering catches and auction prices. The system therefore only covers a small part of the important fishing ports in Europe. As an example of this it can be pointed out that only one port in France is included in the system (Boulogne sur Mer); no Norwegian, Icelandic, Spanish or Portuguese ports are included. Two large wholesale markets, Rungis (France) and Mercamadrid (Spain) are furthermore not

included. The system in its present form therefore gives an incomplete picture of the supply - and price situation in Europe. However, the system is still under development.

The strong side of the system is that the information is made available the same day as landings and price registrations are made. However, this policy is strongly limiting on which fishing ports the system can cover.Only a few ports and markets have registration routines for supplies and prices.

2. GLOBEFISH

GLOBEFISH is the FAO EDP - based market information system for fish and seafood products. The system has been built up and is being marketed with users in all fishing nations of the world being targeted. The system is tied to an extensive market surveillance system based on the Infofish project in Kuala Lumpur. The project is established to disseminate market information and other trade information to companies in the seafood industry in Southeast Asia. Similar projects have earlier been established in South America (Infopesca) and later (p.101) one in West Africa, Infopeche. One project is also planned for the Arabic countries (INFOSAMAK). Each of the projects has built up a network of informants in the individual areas, and the markets for the products of the regions are continuously being monitored and the market assessments are being disseminated as bulletins, mostly by Telex. The staff in the projects go through market reports and other publications for further dissemination. The other important source is the FAO central databank for fisheries statistics. The databank contains statistics for landings, production, imports exports of seafood products globally. The GLOBEFISH system is organized as follows:

MAIN MENU
1. Fisheries statistics
2. Price information
3. Factors affecting supply
4. Factors affecting demand
5. Factors regarding substitutes

6. General economic information
7. Other trade related information
8. GLOBEFISH HIGHLIGHTS

The information in each module in this main menu is organized according to the following sub menu:

1. Product group
2. Fish or shellfish species
3. Form of production
4. Country
5. Time period covered by the information
6. Source

The product groups are organized as follows:

Shrimp
Tuna
Groundfish
Canned small pelagic species (p.102)
Squid sp.
Lobster/crayfish
Crabs
Salmon
Fish meal
Fish oil
General

Which species the information is organized after varies according to the factors being sought otherwise, but covers most commercially utilized species globally.

The information is further divided by processing methods and product forms such as : Frozen, canned, peeled, blocks, fillets, salted, dried, smoked, with shell etc.

The system also makes it possible to search for information by continent and country.

The system suffers in our opinion from a strong imbalance

between the ambition level and the sources available for information. The system is all encompassing and is to cover all species, all markets and all processing methods. The result has clearly been that the information for each product, market or fish species is superficial. The system has in addition become difficult to follow and is not very user friendly. The information can be of a certain use for users with little exporting experience. It is developed primarily for companies in developing countries to stimulate them towards better export marketing and product development. The seafood industry in Norway is at a higher level with respect to market knowledge and will first find the information somewhat superficial.The principal objection otherwise is that only a limited part of the information on the system is of relevance for Norwegian users.

GLOBEFISH HIGHLIGHTS is a quarterly publication (p.103) based on information made available via the GLOBEFISH databank. The booklet contains information on landings, production, imports, exports and price trends. The publication also contains more quantitative information on different trends in the markets, joint ventures and investments in the seafood industry the world over. The sources for the information are the FAO Fisheries Statistics that is processed by the staff centrally, in addition to expert opinions from the FAO network of informants and international fisheries trade publications.

The information is organized according to the same product groups as in the EDP-based GLOBEFISH, i.e. shrimp, tuna, canned small pelagic species, squid, dried / salted fish, fish meal and fish oil. Under these main headings the information is presented by country.

3. SEANET

SEANET is an EDP-based American information system. The information disseminated has as its basis the SEANET database, but is disseminated through printed market bulletins. Plans are

underway to make the information available on line. The system is primarily developed for the American seafood industry, and the information is chosen from conditions of relevance to the American market. The bulletin is issued twice a month, and contains information organized as follows:

1. Market conditions for the next fourteen days. Contains information on the market outlook for the most important species. The species covered are: Cod, haddock, halibut, shrimp, flatfish, "other groundfish", scallops, warm water species.

2. Trade news. Contains information on conditions that affect the supply of seafood, for example weather conditions, (p.104) strikes, new products etc. This part also contains information on new products, new firms, buy-outs, fusions, bankruptcies, marketing initiatives etc.

3. Price registrations. Contains information on maximum and minimum prices recorded for the most important species and product varieties. The main division is: Frozen groundfish, salmon, fresh fillets, warm water fish, cold water fish, shellfish.

4. Supply. Contains information on catch projections for the most important American fisheries and an assessment of the outlook for available imports. Also gives statistics over frozen storage holdings in the U.S.

5. Editorials. Comments on important events that are expected to be of importance for the marketing of seafood.

SEANET is issued by the same publishers as the trade journals SEAFOOD BUSINESS REPORT and NATIONAL FISHERMAN, and the system is based on information collected by the staff of these publications. Additional information is gathered from published

statistics on landings, imports, exports and storage holdings.

4.ERKINS SEAFOOD LETTER

ERKINS SEAFOOD LETTER has two publications; one of these a monthly. It contains information on the consumption of seafood, price developments relative to other foods, some general economic material that is assumed to have an effect on seafood markets, and information on production and demand for substitutes (various meat products). The information apply to the American market, and is broken down for the individual seafood products. The monthly bulletin also has a section with frozen storage holdings for USA and Canada and prices obtained at the two most important (p.105) wholesale market in the U.S.(Boston and New York).

The half yearly publication contains a somewhat more thorough analysis of market conditions:

Part 1 gives an overview of the supply, storage and demand situations for seafood in general.

Part 2 gives market projections broken down by individual species.

Part 3 is an list of seafood companies with inquiries regarding purchases of various seafood products.

The publications are based on contacts with people within the international seafood industry, and official reports from the American fisheries administration, FAO, European Supplies Bulletin and the Canadian Department of Fisheries and Oceans.

5. EUROPEAN SUPPLIES BULLETIN

The publication is issued by the British governmental Sea Fish Industry Authority and has two part.s; one quarterly and one yearly. The publications are based exclusively on official statistics, and contains a presentation of statistics with

comments. The geographic area covered by the publications is Western Europe and USA/Canada. The species covered are most of the commercially utilized species in the waters of these countries. It contains landings, foreign trade and consumption of seafood in retrospective. The information is organized as follows:

1. Summaries by species with statistics over landings for the most important fish and shellfish species. The species covered are cod, pollock, haddock, redfish and herring, and the statistics are further broken down by the individual producing countries.

2. Overview by countries with detailed statistics for (p.106) landings, imports and exports of the most important species for each country. Auction- and wholesale prices are also given for the most important species. The statistics are presented with comments regarding changes relative to earlier periods.

6. EUROFISH REPORT

Issued every fourteenth day by Agra Europe Ltd. as a market bulletin. The area and species covered are the same as for the European Supplies bulletin. However, the information is more qualitative, and the bulletins are not as dominated by summary presentations of statistics. The information is organized as follows:

1. Information from Brussels. This part contains information on the quota distribution between EEC countries, the individual countries special quotas with third countries, fisheries projects supported by the EEC administration, customs conditions etc.

2. Trade news. Contains short summaries of news relevant to the

seafood industry in general.

3. Supply and prices. Presents import and export statistics and landings for some countries , and also lists average prices in important ports.

4. Regulations. Publishes new regulations for the fisheries sector from the EEC.

Most of the information in this publication has been taken from other publications, for example the FAO INFOFISH, but for coverage of EEC fisheries policies, it is alone in the market with this type of information.

7. INFOFISH TRADE NEWS

The publication is issued ever fourteenth day. The publisher is the FAO project Infofish in Kuala Lumpur. The bulletin is primarily aimed at the fishing industry in Southeast Asia, but attempts are also made to market it to western countries.

The information is organized as follows:

1. Fresh and live fish
2. Frozen fish
3. Chilled and frozen tuna
4. Frozen shrimp, lobster and crabs
5. Frozen molluscs
6. Dried, salted and smoked fish
7. Canned fish and shellfish

For each of these product groups there is a detailed overview of prices broken down by individual species or products.

There is furthermore some information on supply and demand in selected producing countries and markets. The species and markets covered are to a large degree chosen from the product

spectrum in Southeast Asia. The system has a relatively good coverage of the Japanese market.

8. SEA SEARCH

SEA SEARCH is not a market information system in the meaning that the service offered is information on market conditions. The system is an American network to ease the communication between individual actors in the market. The system is interactive with the users, and the suppliers enter offers with product specifications directly from own terminal. Correspondingly the buyers send in their inquiries directly. The system is also tied to the transport sector where free capacity and the geographical coverage by the individual transport (p.108) companies is listed. Information on cold storage rentals with information on free capacity is also available through the system. The system only covers the U.S. so far, but an expansion to Europe is planned.

9. SHRIMPNET

SHRIMPNET is a system under planning that would be operated the same way as FISHNET. The initiative for this system was taken by AGB who owns and operates FISHNET.

The system is aimed at coordinating information on shrimp markets on a world basis. The information in SHRIMPNET would also be real time data on prices, landings and storage holdings. This is, as for FISHNET, the most essential difference from other systems. The other information systems build on data from official statistics, and it is therefore historic information that is being presented. SHRIMPNET aims at describing the market situation at the moment of sale. The information will be organized by shrimp species, type of package, size and degree of processing, and it will also be presented for each market (for example, peeled Pandalus borealis, 200-300, 12 pounds bulk,Fulton

Fish Market). Shrimp are to a small degree marketed through auction systems, and information from processors and processors/importers is not available to third parties. The price information will therefore be gathered from wholesale markets where there is a system for registering average prices. The market information will be based on a network of correspondents from the central wholesale markets the world over.

The information on production, i.e. landed quantities for the individual areas and shrimp species must be based on official statistics and can therefore not be made available on real time as in the FISHNET system.

SHRIMPNET takes aim at developing a system where (p.109) parts of the system is interactive with the users. The buyers punch in information on shrimp species, quantity, size, packaging, price idea etc. for the lot they are interested in. The sellers put in corresponding information on what they have to offer. In this way it is aimed at rationalizing the work to be oriented in the market for both groups of participants. The concrete negotiations could be done through telephone/telex, but the idea is that the searching phase will be less time consuming and cheaper through a joint system.

10. ESMERK INFORMATION

Esmerk Information is an EDP - based information system that specialize in going through printed publications such as periodicals and reports and picking out and disseminating information ; it is like an EDP - based "clipping service". The system has modules for a number of sectors, among others for fish and shellfish. The system has the following features:

A number of trade periodicals, newspapers, economic periodicals and reports from the relevant sectors are regularly scanned and monitored. Articles are selected on areas that are to be covered by the information. A summary is written which is entered into

the system together with the reference. The information on the fisheries module is organized into four areas:

Fish farming (aquaculture)
Saltwater fishing
Other fishing
Fishing industry

The information is organized further into topics under these main headings, but each user can have the information tailor made according to topic to suit any interest area.

The system also supplies reprints of whole articles. (p.110) A prospectus from Esmerk Information shows that the system can disseminate information on : Establishment of plants, financial arrangements, tagging of fish, fisheries research, production projections, market outlooks, export statistics, product development, quota negotiations, production statistics, law of the sea etc. Which information that can be made available through the system is determined by the news coverage in the part of the press the information is gathered from. The result is a very broad coverage of areas. The depth is, however, limited to an article for a problem for a country. The system meets the demand for current sector information, but does not give basis for closer studies of a problem complex.

11. SOME DISTINGUISHING FEATURES OF THE SYSTEMS

We will in this section go through some features of the operation of the existing systems.

Common for these systems is to some extent which sources that form the basis for the operation. These can roughly be divided into three parts.

First, most of them make use of official statistics. The statistics available for use in the market assessment of seafood consist of export and import statistics, landings, prices and to a limited extent storage holdings (these are mainly recorded in

USA and Canada).

The systems furthermore make use of information available in trade journals, economic periodicals and reports available to the public.

In the third place, some of the systems have a network of informants that supply the system with information.

A combination of these three sources form the basis (p.111) for input of information to the system.

With respect to the degree of data processing carried out internally on the individual systems, i.e. to what degree the staff themselves carry out independent analyses and evaluations, this seems to be very limited. The systems are limited to taking in and further disseminating opinions that have already been published (interviews, reproduction of analyses) . Statistics that are presented is largely descriptive.

The information is organized by product and by country.

The frequency of data updating and the freshness of the information is guided by when the various sources are available. FISHNET is the system where there is the shortest time between the actual "happening" and the time when the information is available through the system. Systems that are based on statistics and publications carry out updating continuously as the publications are published. With respect to information from the network of informants, the information can flow to the system almost simultaneously as the event takes place, but the availability for the users is delayed through the registration routines in the system itself.

18. PRINCIPAL MODULES IN THE SYSTEM

Our idea of the system is that it would consist of two main modules that set different demands to sources and updating frequencies and that could also be used for different purposes , and at different frequencies.

One part will comprise a market monitoring system where current information on market conditions is fed in and retrieved. This part will be characterized by being resource demanding because the information has a relatively short life span, and the conditions the information are to follow are changing constantly. This part will also set high demands to the sources being accessed , and to the personnel that chooses and evaluates the information.

The other part would be a database part that makes available information of more lasting character. This information will not apply directly to the marketing situation at the moment, but will be information that is necessary in association with the marketing activities of the companies. We imagine that this part will be as a type of reference work for the exporters where they can find relevant information for planning purposes, and information that can be necessary in situations that can occur in connection with the export. The type of information we have in mind for the database will not place the same demands to continuous monitoring and to updating. Most of the work will be in entering the data in the first place.

19. WHAT INFORMATION? - THE SYSTEM PART

In section 14 we showed how the information should be organized to obtain the best possible accommodation to corporate structure, product structure and market structure in the Norwegian seafood industry. The conclusion was that the information should be organized according to the most important seafood products and the most important market countries.

In this section we will discuss details of what information would be relevant to input to the system. This is done based on the results from the requirement study and with basis in general knowledge of the markets for seafood products.

First we will limit the information requirements the system should be able to disseminate. We have earlier explained that information requirements are guided by the decisions the information is supporting. One likely information requirement for an EDP based system is information on the daily swings in the market situation for fish and shellfish (especially fresh fish). It is this information requirement FISHNET is aiming at covering. Information of this type set strict requirements to registration routines. These are set outside the system, and must be seen as a basic condition. One of the conditions that is relevant to disseminate information on are landings. As far as we understand FISHNET has exhausted their possibilities regarding dissemination of information on landings. For Norwegian landings we can see no possibilities for transmitting information on landings the same day as landed. The landings are registered in each individual plant on slips from the Raw Fish Marketing Coop. The slips are sent in to the Coop. within 14 days after the time of landing. The quantity is registered on the internal system of the Coop, and is being made available through the Directorate of Fisheries at the earliest 5 weeks after the time of landing. Corresponding registration procedures also exist in other countries so that the opportunities for presenting a total picture of the supply situation are not present.

On the demand side there will also be day to day (p.114)

variations in supply requirements as a result of variations in the quantities in storage by the importers. Registration of storage quantities only occur to a limited extent in USA, Canada and, for certain products, in Japan. Storage statistics are published monthly. There are no routines in place to monitor the short term variations from day to day.

As we can see it, there are no real alternatives to personal contact between buyer and seller with respect to the very short term information. Any short term information available today is covered by FISHNET.

Our conclusion is that the system must concentrate on disseminating information of a more long term character. What we have in mind is background information to assess supply and demand, and to evaluate the situation for some time in the future.

Based on requirements and the sources available to the system we will outline which information that should be included. The information considered relevant to be entered into a system for continuous market information is determined by which factors affect supply and demand of the product in question. We have already noted that these factors are different from product to product. For stockfish the economic situation in Nigeria has at the present time the greatest effect on the demand. Scanning of trade journals, together with interviews with key personnel in export businesses, has made it clear that a number of factors affect the demand for Norwegian seafood products, and that these factors often are different each time. As guidelines for sorting out information we can still introduce five principal factors that affect demand:

Consumption of the product
Exports by other nations
Supply of competing products (p.115)
The competitive situation relative to other nations
Trade restrictions
The economic situation

Each of these factors is a result of changes in different background factors. Some factors affect developments in the short term, other factors have a more long term effect. Of factors that affect consumption we can mention developments in buying power, diet trends, availability of new products (for instance surimi based). These are conditions that change slowly and which has a lasting effect on demand. Of factors that lead to a short term change we can mention heat waves, religious holidays, vacation periods etc.

As an example of factors that affect the exports from other countries we can mention landings, that in the long term are determined by the resource situation, while in the short term factors like ice conditions, fleet capacity, weather and processing equipment in the industry can be more important. Supplies of substitute products varies with the production volume. A large catch or a high volume of farmed warm water shrimp will have an effect on the demand for Norwegian shrimp for certain uses. The demand for salmon will be affected by the supply of wild salmon, both Pacific and Atlantic.

It should be noted that information that is relevant to enter into the system is different from species to species. It would not be possible beforehand to set up a complete list of those conditions that affect supply, demand, competition or trade restrictions. The selection criteria for the information must be to clarify if conditions affect consumption, exports, supplies of substituting products, the competitive situation or trade restrictions.

To give a reasonably complete description of the (p.116) conditions that affect these key factors with respect to the markets for seafood, it is necessary to have long experience in the trade. General market knowledge will furthermore be a precondition for being able to see the relationship between events in and outside the sector and key factors. To survey these conditions would be a research project in itself. We must therefore be satisfied with giving an incomplete account to have

examples of conditions that should be monitored, registered and information of entered into the system.

1. CONSUMPTION

Variations in the consumption of food products can roughly speaking be due to changes in purchasing power or short- and long-term changes in the composition of the diet. The long term changes in diet can be due to changes in taste, a focus on health, lifestyles that require food that is easy to prepare etc. Common to these factors is that they will be difficult to predict, and the information must be of a descriptive character. The information must be based on statistics of diet composition and assessment of trends in the consumption of the individual products. Assessments made are : Is the consumption of salted fish on the way down. Will this trend continue. This descriptive information is supplemented with available consumer studies. The information will be used as the basis for long term planning in the companies and in the choice of strategy with respect to products for the future and which markets are to be cultivated.

The short term variations in consumption is due to the fact that the consumption of some seafood products is seasonal. An example of this is the consumption of fresh fish that is generally low in the summer months. On some markets the consumption of shrimp is highest in the summer. Other examples are the consumption of salmon on most markets and of kazunoko (herring roe) in Japan which is highest at Christmas and the New Year. These short term changes in the diet composition (p.117) are ingrained in local traditions for the individual nations and are repeated every year. The trade will have a knowledge of most of these changes, but it would be of interest to make a complete survey and flag these periods with information on which influence they have on the consumption.

Changes in buying power will have a different effect on different products. It is known that luxury products can be less

in demand with a fall in the buying power. For other products the effect can be the opposite. Which effect changes in the buying power are expected to have on the consumption must be assessed from knowledge of buyer groups, user areas and price conditions. This is knowledge that the trade is assumed to have already, so that it would not be necessary to make the assessments in advance, but to only disseminate information on buying power in the individual markets. Price elasticity for various products could also be studied.

3. EXPORTS BY OTHER NATIONS

As we have discussed in Section 15, landings in the various fishing nations will be decisive for the supply of various species offered by them . Which products that are being offered will in turn be dependent on the type of processing predominant in the seafood industry. In the longer term (1 year or more) the landings will depend on factors included in the resource sector (resource projections, total allowable catches (TAC) and quotas). In the shorter term the supply will depend on when the individual fishing seasons open and close. A survey of the individual seasons for various species could give an indication of variations in the supply for individual products and thereby assist in the choice of products and product planning in the plants. Other conditions that affect the supply situation in the shorter term are strikes in one of the distribution chains, either the harvesting -, processing -, or transportation links.

The supply will further depend on the availability of fish and shellfish depending on migration patterns, ice conditions, quotas and stock size.

Information on the fleets and processing industries in the various countries will also be of importance for the future supply situation for seafood products. Such capacity - and structural changes often occur with governmental financial assistance. The programs are often discussed in trade

publications a long time ahead so that it is relatively easy to have access to information on the plans and which species they aim at utilizing.

3. SUPPLY OF SUBSTITUTING PRODUCTS AND PRODUCT DEVELOPMENT

The supply of substitute products will affect the demand for Norwegian seafood products in two ways. One is through the buyers purchasing decisions, where it is usually assumed that a lower price for a product reduces consumption of the substitute assuming that the price is firm, a drop in the price or both. An increase in the supply of a species or a seafood product that has the same use as Norwegian products will, according to this, lead to lower demand and a lower price for norwegian products. The substitutes that would be most logical to monitor are fish and shellfish species with a use closely related to Norwegian products. It is therefore of interest to find out in some detail which species substitute for each other, and information on the production of these can be monitored. We assume that it would be enough to limit the information to near substitutes where a connection between the supply of one and the marketing conditions of the other has been established. In principle, most food products will substitute for each other so that it is necessary to be critical with respect to which species are defined as close substitutes.

It is also possible that information on other food products should be disseminated. The production of meat by the agricultural sector can affect the marketing conditions (p.119) for seafood products if there are large variations in supply. A large increase in the production of meat with an corresponding fall in prices could contribute to changing the consumption from fish to meat. We still do not believe that it would be necessary with a continuous dissemination of information on the meat production in individual countries, but that the production should be monitored for sharp changes.

The other effect of substitution occur when producers of secondary products where seafood products is an ingredient, choose another product as ingredient. This condition has an effect on the market situation for shrimp where warm water shrimp to a certain extent can substitute for Pandalus borealis in pizzas, soups and salads. Norwegian shrimps are usually preferred, but if the price difference between Norwegian shrimp and warm water shrimp become large enough, the producers will give priority to cost reduction before quality. The same effect can be found in the production of smoked salmon. Norwegian salmon is preferred from a quality point of view, but if the price differential becomes large enough, there will be more profit for the smokers to use Pacific salmon in the process.

Under the supply situation for substituting products, one should also place information on development of new products and development of new equipment in the production.

4. THE COMPETITIVE SITUATION IN RELATION TO OTHER COUNTRIES

The competitive situation for Norwegian seafood exports relative to those of other countries will be affected by the price at which products can be offered. The products offered are in most cases nearly homogeneous and purchasing decisions are made chiefly from price. In an homogeneous market like this it is cost structure and costs within each step of the process that determines which price can be offered. The fishing industries in most countries have regional policy functions which means (p.120) that the public sector affects the income- and cost conditions in the industry with income supplements and subsidies on effort factors. Financial contributions from governments are thereby contributing to the price formation on the products being exported. Information on new support measures on the income and cost sides will therefore be of importance to establish changes in the competitive situation with other countries.

Another important factor that contributes to giving other countries a cost advantage over Norway is changes in customs duties and import quotas for individual countries. The customs duties and import quotas are to some extent subject to bilateral negotiations where for example fish quotas are traded against lower duties and/or import quotas. In this part of the system a complete overview over the customs structure is not necessary. This type of overview could be included in the database part. Changes should be registered, however, and be transmitted also in the system part.

At the company level it would be of importance to monitor, register and transmit information on strategy to individual firms as these appear in interviews in the trade publications. Relevant information could include placing efforts on product development, new distribution channels, joint ventures between countries and companies, information and influencing campaigns, vertical integration, fusions, bankruptcies and other information at the corporate level.

5. TRADE RESTRICTIONS

A number of the markets for the conventional products use trade restrictions as a lever in their economic policies. These trade restrictions are often motivated by increasing economic crises so that the background is the economic situation in the individual market countries. To register trade restrictions is a relatively simple task. What is of interest for planning (p.121) purposes, product selection etc. is to predict the introduction of the trade sanctions. This is a very important problem for the conventional industry that in their production cycle must make a decision on product selection 3-6 months before the time of sale. The product selection decision must be made on the basis of an evaluation of the market situation relatively far ahead in the future and main reasons for changes in the market situation is

introduction of trade sanctions. Transmission of economic information from these countries will give the best possible basis for predicting the introduction of trade sanctions.

If we go back to the results from the questionnaire (Table 15 and Table 16), it can be seen that an orientation of the information gathering around these 5 key factors will give a relatively good correlation with the market models of the companies and the use of market information. The companies listed competition, changes in demand, import restrictions and currency rates as the principal factors affecting market conditions. The relationship between the use of market information and the priority information disseminated through this proposal can also be seen.

20. WHAT INFORMATION ? - THE DATABASE PART (p.122)

The database is meant to be used as a databank for the users. With this we mean that it should contain different types of market data that the companies do not need continuously, but are needed in certain cases in connection with special situations that arise in connection with the export activity. It can be seen as a reference book and a planning tool for the companies.

Besides the supply of sources there will not be any special limitations to which data are entered into the database. Our suggestions for elements are in no way exhaustive. One should still be critical in the selection of information and give priorities in close cooperation with the users. The information that is entered must be clearly useful in the operation of the companies. A non-critical entering of information will make the system less user friendly and meet a negative reaction from the potential users. In the following we will give some suggestions

for which information that can be entered into a database. The selection is made with a basis in the results from the questionnaire and knowledge of export activities in the seafood industry.

Most of the information in such a database will be country specific, and it is therefore natural that the information can be sorted by country in addition to topic.

1. REGISTRY OF IMPORTERS

A registry of importers was among the elements in the databases that was given the highest priority by the respondents in the study. In some connections, for example in connection with the entry into a new market, it will be necessary to get information on which companies that are engaged in the import of seafood products. The simplest form of an importer register would be an alphabetical list with name, address, telephone
(p.123) number and telex number. A list like this would be useful, but the value to the users will increase the more information they are given on each importing enterprise.

Relevant information on each company would be:

1. Which region they cover
2. Which region they cover via local offices
3. Which customer groups they cover
4. Which principal products they handle
5. Sales in last few years
6. Bank connection (credit information)
7. Processing equipment and/or finished products
8. References in Norway
9. Name of daily leader

Which region covered by the importer is of importance (p.123 for a Norwegian exporter with respect to geographical coverage of

the market. Most of the exporters try to have several importers in each country in order to cover the whole market. With several importers one is furthermore better covered with respect to sales, and one will usually avoid having to deal with neighboring companies that compete within the same geographical area.

The customer group covered could be of importance for several reasons. One example is exporters of salmon that either sell on to smokers, or for fresh use through the distribution system for fresh fish. Both market segments are important, and an exporter will normally try to export to both. In getting a company or trade name established in the market, it is also of interest to know if the products go to supermarkets, canteens, restaurants or seafood dealers.

Which principal products handled by the company is (p.124) of importance to ensure a certain degree of fine tuning between the product spectrum of the exporters and the principal products of the importer. This is included to ensure that the exporter has a good knowledge of the market for the product in question and can ensure reasonable sales.

Sales are of interest to get a picture of how large quantities one can count on selling through this one customer.

Bank affiliation, references and the name of the daily leader are elements that can give a basis for an assessment of the solidity of the company. The fisheries sector is characterized by bankruptcies and payment problems so that credit rating is one of main criteria in the choice of customer connections.

If the system is assessed to be interactive with users, it would be of great value if the Norwegian firms could have an opportunity to add notes to companies where they have experienced episodes with payment problems and suspicious claims associated with business conditions.

2. QUALITY REQUIREMENTS

An important problem in connection with the export of Norwegian seafood is claims and complaints about quality. The

claims can either originate as a complaint from the importer, or they can originate as a result of rejections by the local fish inspection service or veterinary service. Claims from the importer will normally be based on a subjective evaluation of the quality and the individual importers quality requirements will be difficult describe in writing. Veterinary and inspection services would, however, have regulations to go by with further detailed specifications through total bacterial count, chemical analysis and organoleptic evaluation. A summary of these requirements in each country would be useful for exporters when assessing how reasonable a claim might be. The claims often mean large (p.125) losses for the exporters, and a comparison of the state of the lot when shipped and the quality requirements could give an indication if the claims are justified.

3. CUSTOMS STRUCTURE

Most countries have duties on seafood products, and the customs structure is often discriminating in that some exporting nations are paying lower customs duties than others. In the evaluation of new markets, the duties meeting the products must be included in the assessment if time and expenses should be expended on launching an export effort. The same is of importance in evaluating the development of new products. Through knowledge of the customs structure, the competitive situation relative to domestic producers of the same product can be evaluated.

4. SUPPORTING SERVICES

Norwegian exporters have for various reasons a need for services from governmental service organizations based abroad. The most important of these are performed by the Norwegian Export Council, students posted in fisheries related jobs abroad for certain time periods (Fiskeristipendiater, based in London, New York, Hamburg, Paris and Madrid) and the embassies. The services offered are brief market evaluations, planning of market visits,

evaluation of companies and legal assistance. For consultation of a more geographically limited type, use is made of Norwegian consuls and consul generals that often have good contacts and good knowledge of the industry in their region. We suggest that a listing of these services based abroad be included in the database.

5. COUNTRY PROFILES

For evaluation of markets for planning purposes it is of interest to make available country profiles with basic information on the country as a market and a trader of seafood products.

As the main content in the country profile, we (p.126) think that basic data on consumption and trade should be included for each country.

- Country profile of consumption with statistics of consumption by fish and shellfish species and developments in consumption for the 10 last years. It is furthermore of interest to show the consumption distribution between fresh, frozen and processed seafood of the same species or form.
- Country profile of imports to show which countries that export to this market, and also developments over time. It would here be of interest to show the distribution of the imports over the year with graphs of imports by month. Information on import requirements by the time of the year are therefore readily available.
- Country profiles of exports having in mind re-exports and competition from this country with respect to exports of seafood products to other markets.
- Country profiles of landings with statistics of landings throughout the year and with information on the most important seasonal fisheries.

-Country profiles on prices with statistics over prices on the import -, wholesaler - and retail levels.

In addition to these market data it could be of interest to include information on important consumption centers and wholesale markets, important border crossing locations with information on customs agents and inspection services, frozen storage rentals in the place of destination and transport companies.

The countries that should be given priority in the database are primarily the important markets listed in Section 13. Consideration should also be given to give coverage to countries that are considered to potential markets for Norwegian seafood after consultation with the individual groups within the fishing industry.

According to these criteria, our proposal for a database for the system will have the following structure: (p.127)

---------MARKET DATA FOR FISH AND SHELLFISH - MAIN MENU -------

1. List of importers
2. Quality requirements
3. Customs structure
4. Support services
5. Country profiles

CHOOSE A NUMBER 0_

****

Each of the modules in the main menu will have a sub menu where the information is sorted by country. The importer register should have search possibilities , so searches can be made on volume of sales and principal products.

21. INFORMATION SOURCES FOR THE SYSTEM (p.121)

In this section we will survey and discuss sources available for the market information. A further specification of the individual sources will not be made.

In this discussion we have chosen to eliminate the possibility of establishing a network of personal informants in the individual markets similar to how GLOBEFISH, FISHNET and others gather their information. We have also chosen to eliminate sources that require a high degree of labor input from participants outside the enclave of the system. Under this source we include the development of a system based on interaction with the users. We also include the system that is based on public organizations or that fish farmers and processors shall establish new routines for supplying the system with information ,as we have seen suggested. Our belief is that the system must be based on public, freely available sources and that it should not depend on participants outside the system making special efforts to make information available.

We will then have the following sources of information available:

Periodicals
Statistics
Special reports
Other information systems
Circulars from student market envoys
K - Bank country monitoring
Reports from biological and stock assessment laboratories and groups.

The information found in each of these media will overlap to a certain degree, but we discuss each source separately for the sake of clarity. An overall evaluation of the sources in relation to our sketch of the system will be given at the end of this section.

1. PERIODICALS (p.129)

With periodicals we mean printed publications that are sold freely, and that are published at an interval of maximum quarterly.

Periodicals that are relevant as sources for this information system can be divided into two groups: Economic periodicals and fish and seafood periodicals. Under seafood periodicals there are also food industry publications that cover the seafood sector to a certain degree. Publications on economics contain economic analyses of the individual countries and could be included as information sources on the economic outlook in problem countries like Brazil, Nigeria, Zaire etc.

The fisheries (seafood) – oriented periodicals contain resource information and market information based on summaries of published special reports, annual reports, interviews and in-house analyses. The periodicals furthermore contain information on:

New products
New types of packaging
New preservation methods
Company information
New distribution methods
Food products legislation

We consider fisheries and seafood publications to be the most important source of the system part, together with statistics. Among the fisheries trade periodicals there are publications that cover individual countries, and international periodicals that are aimed at readers the world over and that publish material from the most important fishing nations and
- markets.

2. STATISTICS

Official statistics to be used as input to a market information system include import statistics, export (p.130) statistics and statistics over landings and consumption. Some countries also have official statistics over utilization of fish and shellfish and storage holdings statistics.

Import- and export statistics are normally available on a monthly basis, and the information is usually about 1.5 months old when available. Statistics over landings are also normally available on a monthly basis. Statistics over utilization of fish and shellfish are kept by the trade organizations in several countries and are only available on a yearly basis.

Storage statistics are, as far we have been able to ascertain, only available for USA and Canada, and for certain products on the Japanese market.

3. SPECIAL REPORTS

Some institutions publish special reports with more in depth analyses of the markets for certain products are made. Among the institutions doing this are the fisheries administrations in USA and Canada. Great Britain has yearly "National Food Surveys" that analyze the consumption of foods. Fisheries Research Institutes also publish some market reports that are freely available.

FAO publish at regular intervals market reports for seafood products and markets that are of interest for the Norwegian fishing industry.

Some analyses are also done as student thesis at advanced levels at universities all over the world. These reports are up to the doctors degree level, but most interesting from a practical point of view will usually be theses at the masters degree level and below.

The Norwegian Fisheries Counselors, Fisheries Attachees, Student envoys and to a certain extent other embassy personnel also carry out sporadic analyses that are issued in a printed

form. An advantage of these is that they are often presented from a Norwegian perspective.

Of less easily available special reports are those prepared by consultants. These reports are often issued with the whole sector as a target group and can be purchased for a relatively high price.

Of pure economics reports we will emphasise the OECD yearly reports and the World Bank reports. OECD also has a yearly publication on developments in the fishing industry of member countries. The OECD reports are of a high quality because first the parts of the report are prepared by each countries representatives, and second, they are then scrutinized for contents at the meetings of the commission.

4. OTHER INFORMATION SYSTEMS

In Section 17 we discussed the existing information systems that are directly aimed at fish and shellfish. Of special interest as a supplier to a Norwegian system would be GLOBEFISH that contains import- and export statistics and prices for many of the fish species and markets that are of interest for the Norwegian fishing industry. By using GLOBEFISH, advantage can be taken of the enormous work involved in collecting, processing and presenting this information from each country. Some of the qualitative information from GLOBEFISH that involves "Norwegian" products and markets could also be borrowed for the system.

Of the other information systems, we will especially emphasize Eurofish Report that has good coverage of fisheries policy and regulations in the EEC.

Esmerk Information is a clipping service for the (p.132) fishing industry, and consideration should be given to use this information as a supplement to internal scrutinizing of a periodical.

It should here be noted that we have not considered possible copyright problems in connection with use of the information from these sources.

5. WEEKLY REPORTS FROM THE STUDENT ENVOYS AND FISHERIES ATTACHÉ IN HAMBURG

Norway has established a network of student envoys in important markets for Norwegian seafood. The areas currently being covered are West Germany, France, BeNeLux, Spain, Great Britain and USA. Weekly market reports are submitted weekly. The information is mainly on prices and a situation report on supply and demand conditions. This information can be used as the basis for a presentation of price developments from week to week, and have a certain value for exporters in the planning of market initiatives. A study of the reports can also form the basis for the identification of high- and low seasons in demand. In a few cases the reports also contain information on more fundamental changes in the market situation.

This information system is coordinated by the Export Committee for Fresh Fish that receives, prints and distributes the reports.

Inquiries from importers in the different markets are also made public in association with the reports. Information on the companies can be obtained from the administrative offices of the Export Committee for Fresh Fish on request.

6. THE K - BANK COUNTRY MONITORING SYSTEM

The K - Bank has a staff that follows the economic developments and make analyses of the economic situation (p.133) in countries where the bank or the bank's customers are engaged. We know little of the extent of this activity, but assume that it will be a good source of economic information for the countries covered by the system.

7. REPORTS FROM BIOLOGICAL AND STOCK ASSESSMENT LABORATORIES AND GROUPS

Information on resource conditions are meant as the principal element in the resource information part that has been described several places in the report. Written information from scientists includes cruise reports, resource projections and reports from meetings in international commissions. It is at the meetings of these commissions that a consensus is reached on the resource situation. Quotas are established on the basis of these reports. The most important source of resource information will therefore be the reports from the meetings. Cruise reports and the opinions of scientists after a cruise will also be of interest. Stock assessment and resource projections are associated with relatively large measurement uncertainties, and the estimates are often revised as new cruise results are made available.

8. SOURCES FOR THE DATABASE PART

With respect to sources for the database part, there is a wider choice available than for the sources to the system part. The system part must be updated continuously, and this sets large demands to the sources in that they must be used over and over again on a continuing basis.The database part will require most of its sources in a buildup phase. Updating will occur less frequently and require less effort in the data collection. We therefore have other sources available for this part. We can for example draw on competence outside the system to a higher degree through interviews and correspondence. As an example of this we can refer to the fact that an importer base can be (p.134) built up by having membership lists of the trade organizations in the various markets. Information on the company level can be attained directly from the authorities in the different countries or from the Norwegian Inspection Service who has extensive contacts with corresponding bodies around the world. Customs

structure for seafood products can be obtained through a special publication from FAO that contains complete information on customs duties and other trade registers by country and product.

Country profiles can also be assembled with basis in available information and can be updated on a regular basis.

9. EVALUATION OF THE SOURCES - SUPPLY/DEMAND

As far as we can assess, there are sufficient sources available to be able to drive an information system as outlined in this report. The system part will be able to draw on information from public documents and statistics.

We also believe that the system, based on these sources, can bring some new information to the users, under the assumption that use of the sources becomes more widespread. Few participants read very many of the publications available internationally. Furthermore, a pre-selection of relevant information by topics as outlined above, would give a more complete picture of the dynamics in the markets than through independent scrutinizing. Much of the noise in the form of non-relevant information will have been removed.

22. MARKET INFORMATION AND MARKET MONITORING - MANPOWER REQUIREMENTS (p.135)

The individual phases of putting together and operating a market information system will require some personnel effort and competence. A short description of the competence needed in the assembly and operational phases will be given here. We will not discuss what requirements are for EDP - technical (software - developing) competence.

As mentioned above, a market information system must be coupled with a market monitoring system. The market monitoring will have as its purpose to monitor events in the markets, register and analyze them and to choose for further transmission conditions that are relevant to the Norwegian fishing industry.

Some of the market monitoring function will, as we have outlined in the system, be external. The sources used for the system do the actual monitoring of the market and register the events in the first instance. The system monitors these secondary sources for registration. Analyses of the events must partly be carried out by the system staff in that they must on a continuing basis decide what information is relevant. Some of the analytical function is built into the system in that the information is given priority and sorted according to the modular construction of the system. Most of the analysis will be done by the users since they must evaluate the importance of the information transmitted and take decision on the basis of the information.

Our opinion is that the job of monitoring and choosing market information for the system will require competence in the field of economics (marketing economics, macro economics, marketing) in addition to a basic knowledge of the Norwegian fishing industry and the markets for Norwegian seafood. The industry knowledge can to a certain degree be compensated for by building more of the choice principles into the system. Through a detailed specification of which conditions that are to be (p.136) monitored and registered, some of the choice process will be "automated" in that the information is continuously registered or rejected after a detailed check list. However, we do not believe it would be desirable to aim for a selection process that is too rigid. Some criteria can be registered through further work with the market models for Norwegian seafood, but the factors that affect the markets are constantly changing and there should be opportunities for flexibility and judgement in the selection process.

The data entering and updating processes will also require labor input. It is difficult in advance to judge how many person years will be needed for this function. The most important variables this will depend on is the magnitude of the system and the frequency of updating. As we have described the system and the sources, the updating frequency will vary from daily to once

yearly. Some of the periodicals likely to be used as sources come out weekly, and so do the reports from the student fisheries envoys. If it is decided to use GLOBEFISH and ESMERK as sources, it would be natural to go through these daily.

Most official statistics is published once a month.

Some of the information in the database part could be updated as seldom as once a year. This would include information on customs duties, quality requirements, importer listings and the country profiles.

Qualitatively the data entering and updating processes would not require special competence. This would be a secretarial function.

(p.137)

23. COMPARISON WITH OTHER INFORMATION SYSTEMS

Studying other external information systems as shown in Section 17, indicated that a Norwegian developed system would not be the only alternative to information gathering for the participant groups within the Norwegian fishing industry. There are already two EDP - based systems on the market. At least two other systems are in the planning- or development phases. In addition to these EDP - based systems, there are external systems that disseminate the information in printed form. There are also a number of other sources of market information that the companies have access to and make use of. Some of these were identified through the questionnaire and interview round.

In the strategy for formulating the system, and the shape it should take relative to alternate sources, we must base it on two conditions: First it should be clarified which type of information is suitable for an external information system. Second, it must be clarified how a Norwegian developed system could offer a qualitatively better system for market information than systems developed in England or the United States.

We mean that an external system can not replace the current information that is floating around in the trade and that

concerns conditions that change from day to day. The information the system should aim at providing must be of a more long term character so that it can be handled with respect to registration routines and dissemination. It should furthermore be of objective character and form the basis for evaluations that the users themselves can do.

The usefulness for users will be at two levels in our opinion. First, a system could handle more sources than each participant in the industry. We have seen on the basis of the results given in Section 5 that management in the fishing industry use relatively little time on administrative (p.138) tasks. The time set aside, and the capacity management has available, to go through the multitude of market information available will be limited. The staff in an external information system will have resources to go through more sources, and will also build up competence that makes the literature search more effective.

Through a more extensive literature search, an external system could offer a more complete and varied news picture around conditions that affect the markets.

The other positive effect on the information flow to the users lies in the fact that the information is gathered together in a medium and sorted in categories that are meaningful in relation to what the information is to be used for. Instead of having to collect bits of information from a large number of written and verbal sources, the users will have a large amount of information presented at one time.

Shaping the system to other systems is an important factor in the competition for the users. A suitable Norwegian system will mostly have access to the same sources as existing systems and systems being planned. The users assessment of a Norwegian system as an alternative will be based on to what degree the system can better be adapted to requirements. The strong sides of a Norwegian system will chiefly be that it will be possible to make special adaptations to conditions and requirements in the

Norwegian fishing industry. There is a great advantage in that the target group for the system after all is much more homogeneous in its information requirements than f.inst. the target groups for GLOBEFISH and FISHNET. The homogeneity in the target group manifests itself chiefly in that there are fewer fish species, fish products and markets to be monitored. It is therefore possible to have a qualitatively better (p.139) information dissemination for each product - and market combination. A scrutiny of GLOBEFISH shows clearly that the quality of the information in the system suffers because there are no limitations with respect to fish species, products and markets. The result is that the information becomes too superficial to be of much value for the trade. Limiting the areas that the system is to cover, and an opportunity to let the operation of the system be headed by personnel with special competence in the Norwegian fishing industry and "Norwegian" markets, could give a Norwegian system clear competitive advantages over international systems. We believe that the key to success with a Norwegian system depends on to what degree one can manage to exploit this advantage and to communicate it to the target groups.

24. AREAS FOR FURTHER STUDY (p.140)

This study was planned and has been completed as a preliminary study. As such it was broadly based to illuminate as many problems as possible that could arise in the development of a market information system for the fishing industry. If a decision to proceed with the work is undertaken, there will be a need to study some areas in further detail to firm up and make operational some of the outlines in this report.

We can see three principal areas for further study.

The first area is to determine the concrete factors that affect the markets for each product. A study of this is necessary for formulating models to determine what information should be entered into the system and how this should be organized. Organization by fish species, products and markets has been settled, but more information is needed on the information to be entered into these modules. A study like this will require that one will build further on the knowledge that the trade already possesses. The other source of information on these subjects is in market reports.

The second area for further study is a closer scrutiny of the decision areas in the individual sectors of the fishing industry that depend on market information. Also here the trade must be extensively consulted.

The third area is a closer scrutiny of each individual source for market information, and development of a model for how the information in these sources should be coupled to key factors in the markets and decision areas for the users.

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TO BE TREATED AS CONFIDENTIAL (p.143)

Return to: FTFI
Box 677
9001 Tromsö

1. Which of the following are most important for the activities of your business? (1 most important, 2 next most important etc.)

___ Raw material supply
___ Governmental management policies, fisheries policies
___ Financing opportunities
___ Markets for seafood products
___ Qualified labor

2. Which part will be most important in the next 10-year period (1 most important, 2 next most important etc.)

___ Raw material supply
___ Governmental management policies, fisheries policies
___ Financing opportunities
___ Markets for seafood products

3. How do you consider the access to market information is for use in your organization at the present time?

___ Good
___ Satisfactory
___ Not so good
___ Non acceptable

4. List the four most important factors that affect the markets for your organization or sector products (1 most important, 2 second most important etc.)

1. _____
2. _____
3. _____
4. _____

5. List the four work areas that the organization routinely is engaged in and that is, or should if possible , be supported by market information: (1 most important, 2 second most important etc.)

1. _____
2. _____
3. _____
4. _____

6. List the four most important sources of market information at the present time:

1. _____
2. _____
3. _____
4. _____

7. In which areas are your access to market information best:

___ Population composition and projections for this
___ Prices
___ Landings in market countries
___ Competition from other exporting countries
___ Market analysis of new products
___ Economic and/or trade political climates in the most

important market countries

___ Consumption pattern

___ Changes in consumption pattern (f.inst. from fresh to frozen, from conventional to fresh/frozen, from unprocessed to ready-to-cook).

Others: _____

8. Which form of information has your organization most requirement for:

___ Short term changes in the market situation

___ Lasting changes and trends in the supply - and demand situation.

(Sections 9 to 12 not included. Translators note)

13. What is a reasonable cost for reliable and relevant (p.145) information for use in your organization:

___ < 5000 kr. per year

___ 5000 kr per year

___ 25,000 kr. per year

___ 50,000 kr. per year

___ 100,000 kr. per year

___ > 100,000 kr. per year

14. Does your organization subscribe to:

___ FISHNET ___ SEANET ___ INFOFISH ___ K-LINK

___ None of these

14. If NO, why not:

___ The information is not relevant for our activity

___ The information is if poorer quality than what we already have access to

___ The system is too expensive
___ Does not know the system

15. If YES, has the organization had:

___ Good use
___ Use
___ Little use
of the information.

CLASSIFICATION DATA

A. Estimate the amount your organization uses per year to gather and process market information (incl. time expended, travel expenses, subscriptions etc.):

kr._____

(p.146)

B. Estimate amount used for marketing of organizations products (all direct and indirect sales expenses, purchase of market analyses, sales promotional measures, time expended on planning of marketing activities etc.)

kr._____

C. Number of employees:_____

D. Number of employees in sales / marketing:_____
(For smaller concerns this is a part of the managers job)

E. Principal product * / product group: _____

F. Does the organization have data processing equipment?
(PC , minicomputer)
____ Yes ____ No

G. Does the concern export their own products?*

____ Yes ____ No

* Only for fishing vessels, marketing coops, exporters, processors.

H. Title of the person filling out the questionnaire.

_____

DECISION MAKING ANALYSIS - SURVEY OF INFORMATION REQUIREMENTS TESTING A METHOD

CONTENTS

		PAGE
I.	INTRODUCTION	147
1.	MARKET RELATED DECISION AREAS IN THE SHRIMP INDUSTRY	148
2.	TESTING OF STABELL'S APPROXIMATION	154
3.	PROCEDURE IN PLANNING A MARKETING TRIP	155
4.	EVALUATION OF THE METHOD	164
5.	OTHER METHODS	166

1. INTRODUCTION

Design of information system, decision support system or expert system must be based on the information requirements of the users of the system. Surveying and describing the information requirements leads to a number of methodological problems, and it is of decisive importance that it at the same time covers the real need of the user and is operative as a basis for the design of the system. This report contains the result from testing of a method suggested in the literature (Stabell 1983) and an evaluation of the method. The method makes use of a decision analysis to establish information requirements through a descriptive and normative modelling of the decision behavior. The report also contains a short presentation of alternative methods for surveying the information requirements.

(p.150)

1. MARKET-RELATED DECISION MAKING AREAS IN THE SHRIMP INDUSTRY

Market related decisions are considered to be decisions that are fully based on information on market conditions and that are registered outside the company. The concept is in no way unambiguous since most activities and decisions within a business contain an implicit or an explicit assumption or evaluations on aspects of the markets. However, the parts of the evaluation criteria that are based on market conditions, and thereby the need for market information as basis for decisions, do vary considerably. We feel it is sufficient to limit ourselves to decisions where market conditions comprise a substantial part of the decision criteria.

Many experts on information systems and decision support systems emphasize that it is the decisions that determine the formulation of the system and what information is to be disseminated through the system. A so - called decision-oriented approximation to the system development is being used. Davis and Olson (1985) discussed 8 methods for identifying the information needs and/or demand specifications for an information system. The methods use as their basis analyses of different factors, but common for them all is that it is the information needs that are the basis for the system development, and that a survey of the information requirements is done by studying the system or organization that is the target group for the system.

The other approximations that have been used in the formulation of an information system, like sources of information, models and theories, technology, salability etc, will with this perspective be considered as frameworks of how far one can go in adapting the system to the decisions to be supported.

Stabell (1983) outlined a procedure for integrating a focus on decisions and decision processes in the functional (p.151) demands of the system, and in the next round, the design of the

system. The basic idea is a user orientation and an analysis of what user orientation means in a development context.

Decision research, i.e. a description and a diagnosis (evaluation of the individual steps in the decision process) comprises the first step in decision support system. In practice this is done through a study of the decision behavior of the users.

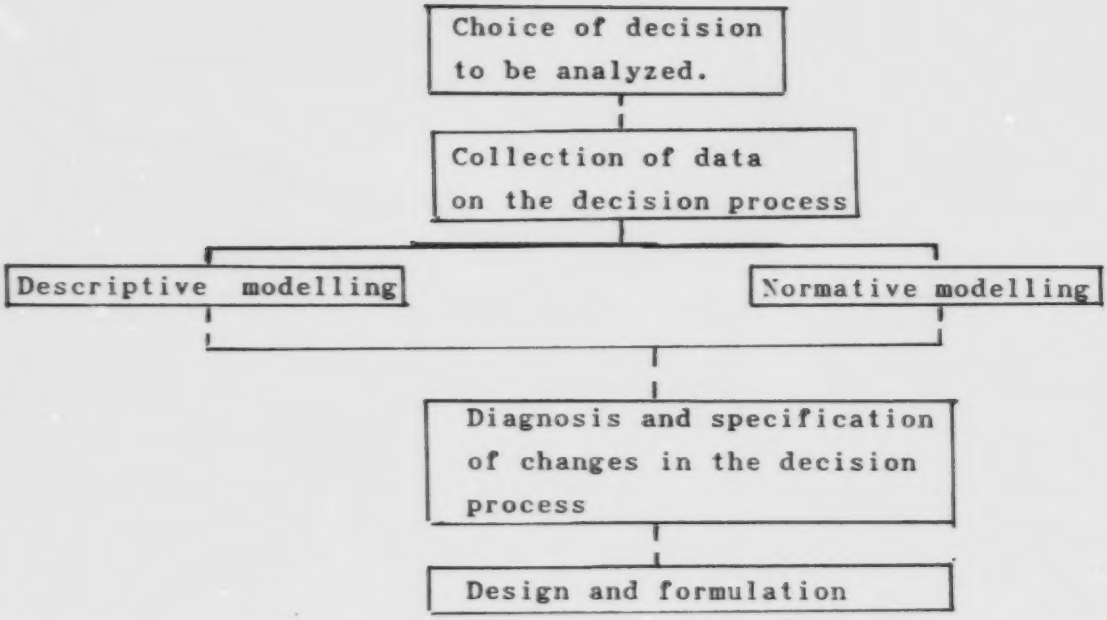
The study includes problem registration, surveys of alternatives, estimation of consequences for alternative, choice of alternative and control of the result. The diagnosis encompasses an analysis of each of the steps with a view of improving the decisions through support from a system.

The support can consist of either generating data on the decision criteria, or a model to analyze data for controllable and non controllable parameters.

In a point form the part that includes the decision research will encompass:

1. Collection of data on present decision making.
2. Establish a complete description of the current decision process.
3. Specification of a norm for how the decision should have been taken.

The steps in Stabells procedure for a decision oriented development of a decision support system are illustrated in the figure below:


Choice of decision to be analyzed.
Collection of data on the decision process
Descriptive modelling
Normative modelling
Diagnosis and specification of changes in the decision process
Design and formulation

From Stabell (1983)

Some research results show that by going through the individual phases in a decision process analytically, one can often show weaknesses in the process. This can involve studying alternatives, data collection concerning criteria for choice of alternatives, the decision model itself (i.e. the criteria) being used etc. Among the reasons for this is that the decision makers themselves are not very conscious of the (p.153) way the decisions are made . The focus is on the results. The sources of what we call suboptimalization of the decision process are given below.

Table 1. Sources of suboptimalization of decisions.

Steps in the decision	Usual distinguishing marks
Goal	Local rationalization
Uncertainty	Evasion
Information	Local search
Learning	Simple

Source: Cyert and March (1968) used by Stabell (1983) in development of decision support system.

Local rationality in the decision process means that only a limited number of action alternatives are evaluated. Evasion due to uncertainty is illustrated by the fact that decisions are made where the results are known relatively quickly. Another example is that one relies on a point estimate for future events that are of importance for the decision. Local search means that the solutions are sought in the vicinity of already known alternatives.

Decisions in the fishing industry.

Below we have made a list over some decisions that are made in the fishing industry. The list is not exhaustive, but is more meant to give examples of the decisions one can choose between in the development of a decision support system. (p.154)
First phase in a decision oriented approach is the choice of decision to be supported.

Product choice decisions.
Part decisions:
What raw material should be purchased
Can the raw material be double - frozen? (thawed,processed, re-frozen)

What products should be produced
What quantities should be produced

Sales decisions.
Part decisions:
Further storage in expectation of higher prices.
Sales to which markets.
Sales to which customers; allocation of limited quantities; allocation of sales efforts.
Price setting through increased understanding of negotiating power as a function of storage, supplies, expected supplies and demand and expected demand.

Raw material decisions.
Part decisions:
What raw material should the business be based on.
How much should be purchased of each type of raw material.
What qualities should be purchased (stimulation of fishing methods, vertical integration with the harvesting sector).

Marketing decisions.
Part decisions:
What products should the company produce in the long term
What markets should be cultivated.
What target market should be chosen.
What form should the company adapt in the target market relative to competitors and preferences.
Choice of communication measures.

Planning a marketing trip.
Part decisions (with basis in: 1) the company needs and/or strategies and 2) the customer information needs):

What country (ies) should be visited.
What principals (importers, agents, wholesalers, supermarket chains, processors) should be visited.
What products should be launched or promoted.
What segments should be covered (geographical).
What price ideas should be given.

Investment decisions.
Which investments shall be made based on market outlooks in the longer term.

Product development decisions - product specifications.
Part decisions:

What requirements shall be covered with respect to industrial raw materials or consumer.
What markets shall the product be developed towards geographically.
What raw materials shall be the basis for the product.

2. TESTING OF STABELL'S APPROACH - PLANNING A MARKETING TRIP

Stabell's approach, with a basis in decisions for development of the decision support system will of course in practice require an empirical investigation of the decision process for the decision the goal is to support. We will in the first instance, as an experiment, test the approach with basis in a concrete decision that shrimp exporting concerns are facing: Planning a market trip. The description of the process will not build on a separate empirical study of how the planning actually takes place in the businesses. We will use our own knowledge about this. The choice of "Planning a marketing trip" corresponds to point 1 in the figure that summarizes the procedure for a decision based development of a decision support system.

Planning a marketing trip - motivation.

The motivation for planning and carrying out a marketing trip can be to discuss a period of trade with existing trade partners. The theme for the discussions can be a summation of problems in the period just past with respect to quality, packaging, sorting, glazing (the product), prices relative to competitors, measures taken by competitors in the period (new products, market communication measures, pricing and distribution). Other themes are plans for the upcoming period (for example 1/2 year, with the seasons that come in this period).

Another subject for the trip can be to make contacts and start negotiations with new customers.

A third subject would be to gather market information (for example through visits to fairs and shows).

Each of these subjects would require different (p.157) preparations, both qualitative, such as on which part decisions they would involve, and on which procedures that would be followed in mapping out alternatives, collecting information, elucidating possible consequences, choices and control.

In practice the managers will have combinations of these subjects by trying to kill several birds with one stone and thereby reduce the costs associated with travel.

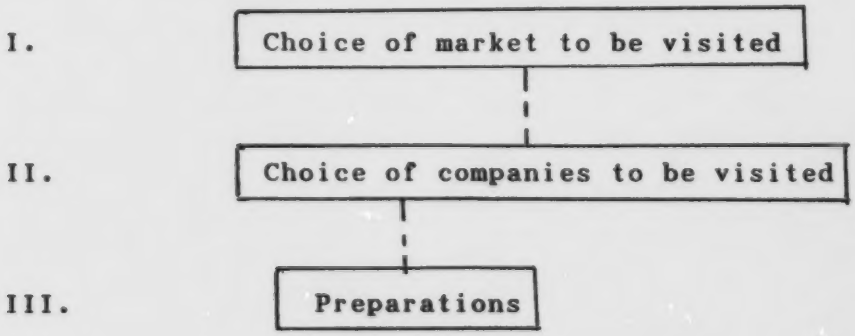
We will in this experiment investigate the procedure for the decisions in a case where the motive for the trip is to make contacts and initiate negotiations with new customers.

We assume that market (country) has already been chosen, and the goal is to set up a route for the visit where the main emphasis will be on which companies to visit.

The decisive factor for the decision to carry out a trip like this can be one of many, such as noting that colleagues are engaged in a market, inquiries that have not been followed up, as a link in the strategy of the company to diversify, etc.

3. PROCEDURE FOR PLANNING A MARKETING TRIP

Below we have schematically outlined a possible procedure for planning and implementing the preparations for a market trip. The purpose is to describe the process, and if necessary identify steps in the process where a decision support system can contribute to better decisions through access to better information, or ease the decision process by making necessary information more easily available.



In this outline we assume that choice of markets have already been made. This is itself an important decision that could have been the focus for analysis.

The decision situation is real and current for export enterprises. Travel budgets comprise a relatively large part of the total marketing budget of the companies, and travel is one of their most important marketing activities. The consequences of "wrong" composition of the customer mass are large in some aspects like choice of growth segment, stable sales, avoidance of payment problems etc.

In line with Stabell's outline of analyses of (p.159) decisions, we will attempt to describe how the choice of enterprises to visit is made. The description will partly be normative because it does not necessarily fall together with how the choice is made in practice.

The mass of enterprises within the distribution of seafood is heterogeneous with respect to a number of factors of importance for the exporters. The goal for choice of customers and the composition of the customer portfolio in a new market, can be to get a composition that is adapted to the company strategy on the market (volume, product, profile, segment).

The first thing to decide on in the choice of distribution form is which level to enter. This is a decision that can be taken quite independently of factors in the individual enterprise in the total mass of businesses at each level.

In the distribution of seafood most countries have three principal layers: Importers/agents, wholesalers and retailers (see Figure 1).

In practice the choice will be between importers or wholesalers. One has therefore two alternatives, and one of these, or a combination of the two, can be chosen.

By selling directly to the wholesaler, the exporter assumes some of the functions the importers usually perform, i.e. handling of orders, transport, risk and credit evaluation. For this to be desirable, the wholesalers must 1) be of a more

For information only
TRADUCTION NON REVISEE

closely specified size, and 2) it must be possible to find a transportation solution to reach them.

The information requirement for this part decision would be data on the size of the wholesalers and information on transportation arrangements.

The next supporting decision would be to choose (p.160) which of the enterprises in the mass to make contact with.

The first step in this decision would be an elucidation of alternatives, i.e. a summary of participants on the wholesale and retail levels. This is a process that in practice is characterized by local rationality because only a part of the possible customers are evaluated due to lack of information gathering. The alternatives can be gathered from company files over previous inquiries, supplemented with lists from the local export assistance office. This local rationality can be optimal if topical alternatives are covered in this way, but the possibility for neglecting to evaluate suitable alternatives are present.

The next step would be to rate the alternatives according to company preferences based on a given number of attributes with customer opportunities. (In object language a multiattribute decision problem is solved. This is a three-step decision process where it is first established which attributes are relevant decision criteria; examples are size, geographical coverage, solidity etc., values for the attributes for each company is furthermore estimated. The firms are finally rated after the sellers have weighted each of the attributes (Stern and El-Ansary, 1982).

Attributes that are weighted have their basis in several different conditions, such as the firm's geographic distribution strategy and strategies with respect to segment, volume measure (market share) for the market, avoidance of risk etc. Below we have listed some attributes that are weighted in the choice of customer mix. Some of the attributes are operationalized since it would be difficult to get information on the attribute itself.

(p.161)

Attribute	Operationalized variable
Solidity	Economic pre-history Last years account and balance Earlier payment problems Economic outlook for the concern
Quantity that can be sold	Total sales Product spectrum
Variations over the year	Distributor/processor and which customer the concern has
Geographic coverage	-
Coverage of segment	-
Quality profile, trade name profile	-
Contacts with other Norwegians	-
Transportation arrangements	-

After listing the evaluation criteria, the next step would be to collect information about them on the company level with the purpose of rating them in relation to the exporters preference function.

The purpose of the decision support system in this (p.162) connection can in the beginning be considered to be two-sided. First to get information on the attributes, and in the next round to calculate optimal composition of the customer portfolio.

A formal optimization requires an explicit preference function and establishment of the value for each attribute. A course of action like this would not be practical to carry out due to missing information, difficulties in setting the value for the attributes (several are complex and qualitative), and the ability of the companies to weigh the factors explicitly.

In practice it would rather be talk about satisfying minimum requirements with respect to important attributes.

With the knowledge level existing today, the main purpose of the system will be to produce information on the attributes. The rankings and choice between alternatives will happen intuitively, but at a relatively high level of consciousness, since each attribute can be evaluated explicitly through the structuring of the decision process that the system implicates.

The company information- and/or decision systems.

Originally the companies have developed a system for meeting their requirements for information in planning a marketing trip. A company will usually make use of several different sources, written and verbal, internal and external . The sources will be adapted to each attribute of customer opportunities that are being emphasized by the company in the composition of the customer portfolio. The sources (and the attributes) will also depend on what information is <u>available</u> to the company with its present information system.

We will carry out a continued hypothetical discussion(p.163) of which sources a company would have available with respect to each attribute.

1. Solidity

Solidity is a key factor in the choice of distributors in exports within the fishing industry. The sector in most countries is characterized by considerable turbulence in supply and demand, relatively low margins and a certain structural change within distribution. These conditions have led to many bankruptcies, and

losses on claims occur frequently (Lines 1985a).

The choice of distributor is therefore associated with a high risk which exporters try to minimize through the collection of information.

The information gathering occur through the use of the network of student fisheries marketing envoys (West Germany, England, France and Be-Ne-Lux, Spain, USA), through the offices abroad of the Norwegian Export Council, through credit information and via the "old boys network", i.e. the sectors own rumor mill. These sources have some weaknesses that we will point out briefly:

The student fisheries marketing envoys are often consulted when evaluating new trade connections. The advantage of this source is that the envoys are the sectors own service people, and the information from here does not require that a relationship has been developed in advance. The weakness is that the envoys have only been in the area that they are to cover for a short time. The knowledge of individual enterprises is therefore often superficial and based on chance rumors. The student envoys will not have a full overview of customer opportunities in the markets either.

The Norwegian Export Council will in individual cases be able to give information on the solidity of a company. In countries with student envoys, these are stationed together with the Export Council representatives.

In countries without student envoys, the Export (p.164) Council can use its contact network to obtain ad hoc information. The quality of the information will be circumspect in that the organization usually does not have much cooperation with the trade and would therefore only with difficulty be able to carry out their own evaluations. They would also not be able to confirm the information from their own informants due to lack of competence in the seafood sector.

Credit information is available in most markets in industrialized countries. Information is historical data, chiefly based on accounts and annual reports. In depth credit information is also based on recordings made by collection agencies and demands registered in bankruptcy and probate courts etc. On the basis of these data a collective evaluation of the company is made, often in the form of a numerical grade. An important weakness of the credit information is that the data will not yield any information on the economy of the concern at the present time. In the distribution of seafood, large values are being sold with small margins. Price negotiations are carried out based on market expectations for a week ahead or more. In this period the market can fall considerably, and the risk of buying at a price that is too high is relatively great (Lines 1985a). The economic conditions of a business can change very quickly, and these changes are not registered quickly enough in the sources that the credit information offices make use of.

"The old boys's network" consists of informal contacts between participants. Companies in the seafood sector have developed a network of personal contacts in Norway and in the market countries.. These sources are contacted to give personal evaluations of the concern to whom export is being contemplated. The strong side of these sources is first that the horizon back in time is longer than for the credit information. Second, the source will have an opportunity to inform on recent (p.165) changes in the financial situation of the companies that might not yet be registered in the sources used by the credit bureaus. The weakness of this network is that the information can be distorted due to personal bias. Non-verified rumors will also be spread through this source. Furthermore, the source is only well developed for a narrow group of exporters with a long history in the trade. Newer exporters will not to the same extent have access to this information.

Use of these sources for assessing new customers will

usually not remove all risk associated with the solidity of the concern, but will reduce it. It appears that the sources that the Norwegian export concerns use include the sources that are available for credit evaluations (see Brealey and Myers 1981, section 26). An external system will have excess only to some of these sources, and it would be unnatural to go through this system. However, the external system can offer a file with full reference to the student envoys, offices of the Norwegian Export Council and some credit information bureaus. The advantage for the user is that he collectively have access to which organizations can be contacted in a way that is structured relative to the decision problem being faced.

2. Quantity sold.

The quantities being sold will in some cases be critical for choice of importer. First, a Norwegian exporting concern will have a more or less fixed lower limit for the size of the customers serviced. Many of the costs associated with handling orders are independent of the size of the orders. Furthermore, the transportation costs will increase so that the competitive skills for Norwegian exporters relative to local distributors will be weaker than for small quantities. The possibilities of covering the added expenses by calculating a higher price (p.166) to small customers are not always present since the customers have alternative suppliers. In addition there is the loss of goodwill through sales to the customer's customers.

Second, Norwegian exporters will seek to limit the number of contacts in each market. Many have as policy to only have a couple of steady customers in each market. This makes the sales effort easier, at the same time as the exporters achieve a better knowledge of each individual customer. Often it will be desirable to service customers where there is a certain balance between the size of the exporter and importer. A large importer will be interested in larger suppliers in the same manner as a large exporter will be interested in a large importer to limit the

number of contacts.

The size of the import firm has two dimensions in that both total sales and the sales of specific products are of interest. Even among concerns that distribute in the same market there will be a certain distribution of labor with respect to which seafood species and product variants the concerns have specialized in. However, there will usually be a connection between the size of the total sales and the sales of each individual product.

Information on total sales can be had through the reports from credit information bureaus. In cases where credit information is not taken, the exporter will have to rely on more inexact information from colleagues or on the contact the exporter has already had with the concern. Roughly,the sources of information on size and product spectrum will be the same as for solidity.

Information on which product spectrum the firm is working with, and the quantities of each product, must in each case be obtained from the firm itself or from other concerns within the trade. This is information that is not registered in any (p.167) generally available media and is therefore not easily available for participants outside the sector.

An external information system would be able to use media in a systematic way as a source of information on the corporate level. Trade journals like the Seafood Business Report, Seafood Leader, AFZ, Le Marin, La Peche Maritime, Maree de France, Dansk Fiskeritidende, Fishing News International, Fish Farming International and others contain several types of material with information on the corporate level. The publications contain interviews with representatives of various enterprises where information on these are given. The publications furthermore cover investments, mergers, marketing measures etc. through articles that often contains a presentation of the enterprise. A systematic study of company advertisements will also be a source of information on product spectrum and in some cases the magnitude of sales.

Use of publications as a source of information on the corporate level is made by some external EDP-based information systems (f.ex. Esmerk Information). These systems have larger international banks and industrial concerns as their target groups, and the enterprises covered by the systems are large and have their dispositions covered in international business magazines and - papers like Business Week, Financial Times, Økonomisk Rapport, Le Nouvel Economist, Expansion, L'Express etc. The publications that are monitored and that bring information to the systems normally do not cover enterprises in harvesting, processing and distribution of seafood products. The discussion of the attributes solidity and quantity gives enough basis for evaluating the method.

4. SHORT EVALUATION OF THE METHOD (p.168)

The method appears to be of use in the job of pointing out selections of choice and information requirements at each stage of the decision process. An analytical discussion of the whole decision process gives an opportunity to coordinate demand and support throughout the system. The method gives a good basis for choosing how the information is to be organized relative to what the user will need in the decision process.

Practical use of the method will for most decisions require field investigations of how the decision behavior (alternative, information gathering, choice) actually is in the concerns. An important point in that connection will be the sources that are consulted to obtain information on the attributes. In a context for developing an external system, consideration must be given to this to avoid overlapping.

The method is good for identifying information requirements. The method will identify for which conditions information should be collected, but the problems with sources regarding these

conditions are not solved.

The method will be resource demanding. Each decision situation will require its own analysis, and the construction of the system must be done by breaking the information requirements down to individual decisions.

The objectives for use of a decision support system are often defined as:

1) Better the effectivity of the decisions
2) Better the efficiency of the decisions

Better effectivity means changes in the way the (p.169) decision is made so that the decision becomes qualitatively better in relation to the objective of the decision. This means for example that more alternatives are evaluated, the selection criteria are changed or an improvement in the selection itself.

Better efficiency means that the decision process is not changed , but that it is carried out with less use of resources (decision makers time, costs, efforts).

The advantage of using a decision support system in planning a market trip will be most clearly visible with respect to the efficiency of the process. The primary task of the system is to make information on the selection criteria easily and clearly available. However, the effectivity could also be improved by having the system choosing which attributes are being assessed. Without the system it is not given that the selection of companies to be contacted is done at such high conscious level. In this connection the system has the same effect as an expert system, where the expert's knowledge on which factors that are relevant in the choice of distributors are made implicitly available for the user.

5. OTHER METHODS FOR SURVEYING INFORMATION REQUIREMENTS

Below we have given a short description of some alternative approximations for demand analysis and design of information system. The main objection against using a decision -analytical approximation is that not all activities with information requirements can be analyzed as a decision process.

1. Normative analysis.

Methods that are based on the fact that the decisions and/or the work that is to be supported by the information system (p.170) essentially are alike and have the same structure from company to company. This results in having algorithms that describe the individual steps in the decision process or work operations. In this way the problem can be structured and can use this algorithm as basis for further adaptation to individual organizations. The method is best suited for decisions or work tasks that are structured and where the structure in advance is well known.

2. Critical factor analysis.

The method involves asking the decision makers which factors are of most importance for a good result in carrying out their functions or their decision making. The answers can normally be grouped around a few factors that in the next instance define on which conditions the system should disseminate information.

3. Process analysis.

The idea behind the method is that the activities and decisions that are taken in a concern are more or less functionally separated (marketing, processing, logistics, accounting and financing, personnel etc.) The leadership functions can also be categorized in this way. The processes that are carried out in the company are relatively stable over time, and the information system should be built up around these

functions. The method involves in the next step identification of critical factors (point 2). An analysis of the existing information system finally forms the basis for choice of process, or part of a process, as an objective for the information system.

4. Goal - means analysis.

The method looks at the activities in a company as a process where goals (products, services, information) in the various divisions of the company emerge as a result of a bundle of means. The managers are asked to define goals and means for their(p.171) unit. In the next round they are being asked to describe measures for effectivity and efficiency for the activities they are responsible for.

Effectivity means that the activities are optimal relative to achieving a goal (for example the function of the accounts as control instrument for income and costs). Efficiency means that the activities that are actually carried out are performed with as little use of resources as possible (for example the accounting routines are not very costly with respect to wages, equipment etc.). The method takes aim at orienting the system towards information on the factors that measure efficiency and effectiveness for the operations.

5. Questionnaire and study of existing information system.

Questioning the potential users of an information system about information systems has been done, but the method has some sources of error that are difficult to correct for. The respondents will normally reply based on the information they have had a use for recently, they will inquire about information they will not use later, and they will have problems with firming up the information requirements in a way that it can be of help in the system development.

Furthermore, existing information systems have been used as basis for developments. This is done through analysis of the system in the organization where the new system is to be

implemented, adaption of systems developed for others, similar organizations, implementation of standard packages and with basis in literature descriptions.

(p.172)

FACTORS AFFECTING THE OUTCOME OF THE INFORMATION SYSTEM PROJECT
SUMMARY OF A LITERATURE STUDY.

CONTENTS

	PAGE
INTRODUCTION	171
FACTORS THAT AFFECT THE RESULTS OF INFORMATION SYSTEM PROJECTS	172

1. INTRODUCTION (p.174)

Since the concept of EDP - based market information systems (MkIS) were developed, it has been experienced in a number of cases that the implementation of the systems has been met in part with impenetrable barriers. After the development of a system for an organization has been completed, it has in many cases been reported that the target groups for the system (middle management and top management in an organization) have used the system either to a limited extent, or not used it at all.

These experiences have resulted in some research to find the reasons for some systems are adapted by the users, but other systems are rejected to various degrees.

In this field of research both the systems themselves and the environments where the systems are to be implemented, been subject to studies. Several experiments have been made to identify factors in the systems and system developments that can explain the variation in the adaptation, and attempts have been made to identify organizing factors and user factors (attitudes, personality characteristics).

In this literature survey we will summarize some of the results from studying the factors in the environment where the systems are to be implemented. The purpose of the literature search is to increase our understanding of conditions that affect the result of a system development project, and if possible draw on the extensive studies in the international research environments for use in our own development work.

2. SUMMARY OF A LITERATURE SURVEY (p.175)

Jobber and Watts (1986) carried out a study of the correlation between the use of EDP - based market information systems in British industry and:

1. Attitudes to the concerns MkIS
2. Perceptions of the situation of the organization (the concern).
3. The personality of the user.

Use of the system was measured with the help of 7 parameters, for example the part of (relevant) information from the routine reports that was used, number of inquiries for information from the system per month, number of hours used for reading of reports from the system and combinations of these.

The selection included in the study was 33 concerns that in an earlier study was found to have implemented or planned to implement an EDP - based MkIS in the organization.

A total of 61 factors and/or comments re. attitudes to MkIs and conceptions of the organization were found in a exploratory preliminary study. These factors were used in the questionnaire study to catch nuances in the replies. The factors were then categorized by the principal factors 1,2 and 3.

The results of the study were that a significant connection was found between the respondents use and :

1. Attitudes to the undertaking: MkIs

Among the attitudes to the system was the users attitude to which degree the system supported him in his work, the degree of sophistication of the system, user friendliness and (p.176) opportunities to adapt information and/or reports to individual requirements positively correlated for use.

2. Views of the organization

Among the views expressed about the organization were the perceptions of the firm's degree of sophistication positively correlated to use, skepticism from other middle managers (and other users) and an unpopular section for system development negatively correlated.

3. Personality

Marketing managers that were categorized as neurotic personalities were found to use the system more than the other categories (introvert and extrovert personalities).

The authors draw some tentative conclusions with respect to which implications the findings have for system designers:

The systems should aim at making it possible to have easy access to information, opportunities for extensive statistical analyses of data and built in opportunities for separating each users information requirements and give access to information adapted to these requirements.

The factors that are mentioned above all had a significant effect on use or not use of MkIs (p,0.05). The specified variance was low, however (R2,0.3%) and that shows that there are other factors that together are more important for determining use. One of the factors is the construction of the system.

Of other findings with respect to variation in use and adaption and attitude to MkIs, Guthrie (1974) has identified earlier experiences with information systems, leader (p.177) training and organizational environments as factors determining the attitudes to MkIs.

Lucas (1978) found that the users view of computers generally , and of the system developers, affected the attitudes towards MkIs that in turn was positively correlated for use and perception whether the information system project had been successful. In another study Lucas (1975) identified five main

factors that were included in determining to what degree the user would in fact use an EDP - based information system:

1. The users's attitude and perception of EDP - based information systems.
2. Technical quality of the system.
3. To what degree the information from the system improved the flow of information for the user.
4. Factors in the organization or section where the system was to be implemented, and personal factors in the users.
5. Decision behavior and style.

With respect to the connection between attitudes and use, Lucas (1976) distinguishes between attitudes to computers and EDP - based information systems in general and attitudes to what degree the specific model used in the system can satisfactorily describe reality. Regarding attitudes to other more specific sides to the system, Lucas (op.cit.) found a positive correlation between use and attitudes to : The quality of the database the system draws on, the simplicity of the model, how easy it is to understand the model and the contribution of the database to covering the total information requirements of the user.

Table 1 shows some of the factors that have been reported to affect the use of an information system.

TABLE 1. ATTITUDES TO AND USE OF AN INFORMATION SYSTEM

Factor Name	Number of Items	Description	Sample item
I. Performance	13	Effect of system on managers job performance and performance visibility	I have more control over my job
II. Interpersonal	5	Interpersonal relations, communication,and increased interaction and consultation with others.	I need the help of others more.
III. Changes	4	Changes which occur in organization structure and people dealt with	The management structure has changed
IV. Goals	9	Goals will be more clear, more congruent to workers, and more achievable	Company goal have become more clear
V. Support/ Resistance	11	System has implementation support; adequate top management, technical and organizational support and does not have undue resistance	Developers of system have provided adequate training to users
VI.Client/ Researcher	3	Researcher understand management problems and work well with their clients	I enjoy working with those implementing syst.
VII.Urgency	12	Need for results, even with costs involved; importance to self,boss, top management	The sooner the system is in use,the better

From: Schultz and Slevin (1975)

Maish (1979) and Robey (1979) both found positive correlation between attitude and use, while Schewe (1976) did not find such coorelation and concluded that other, situation conditional factors were important and weakened the relationship between attitudes and use.

Edström (1977) carried out a study of the connection between use of management information systems (MIS) and the users participation in the individual phases in the development process. The study was made on 13 enterprises in the Paris region where the systems were less than 1 year old. User participation from five different participants was used as a variable if the system was perceived to be a success. The participants that could influence the development was user, section manager (for the section the system was to serve), the manager of the system development section and the project manager. Only the influence of the user had any significant effect on the final result if the development process was seen as a whole.

By dividing the development process in several phases: Startup, establishing information requirements, establishing scope (i.e. which specific decisions are to be supported), system analysis, programming and implementation, several interesting facts were brought out. The influence of the user was positively correlated with success in all phases except the implementation. The section managers influence in the later phases was negatively correlated with success. The results from the studies are indicative to the extent that variation /low selection has affected the significance of the results.

Another interesting finding from the study is that ineffective communication between system developer and user will have a negative effect if the system is to be considered a success. The user's degree of structure in the work is used as a measure of the climate for communication between user and system developer.

Alter (1980) did a study of 56 decision support systems in order to identify factors that affect to which degree the systems

were successful (i.e. appreciated by the users). The following conditions had a negative effect on the use of the systems:

- The information was not presented in a form that was familiar to the user (maps, graphs, flow diagram did not agree with the presentation of the problem usually encountered by the user).
- The decision support system forced the user over to representations of the problem that were unknown and that had little to do with the user's common concept of the problem. Problem and problem solutions are formulated in technical language that was not known to the user.
- The systems differentiate between the phases monitoring (of situations that require a solution), survey of action alternatives and choice, while the decision makers in practice treat these phases interactively or simultaneously (this specification of phases in the decision process is based on Simon (1960)). Some systems were concentrated on the monitoring function and left out the two other phases (data oriented systems), while other systems left out monitoring and focused on mapping out alternatives and/or choices (model oriented systems). The three phases form an integrated unit for the users, as mentioned above.
- The decision support systems give memory aid for information of more lasting character. The decision makers are, however, also used to using this type of external memory for short term ad hoc information. This type information has often not been included in the design of the system. The use of the system itself also require support to remember name of functions, data etc. Lack of support for this has affected the user friendliness of the systems.
- The decision support system moves the control (p.181) function with respect to how information is collected, and the interpretation of the data, from the decision maker to middlemen that operate the system. At times processing and interpretation

of the data is done internally in the system. This creates communication problems between decision maker and the other participants (both people and system).

Piercy (1979) discussed some of the results and theses from behavioral research in organizations and organizational theory, and predicted which consequences some behavioral patterns will have on information influx and use of an MkIs. The article is not theoretical to the extent that it is not his own empirical results being presented. The factors are main points from organization theory, organization psychology and innovation theory which is related to development and implementation of market information systems.

Piercy (op.cit.) states that a marketing information system leaves it up to the individual to bring in, group, send out and interpret data.Deviation and conflict between individual goals and the organization's goal can result in the supply and use of information from the system being made selectively, and in such a way that the decision makers will not have access to all information. The author points out that the selectivity can take a form that the individual that supplies the system with information will over-represent measures,areas or projects where the individual has technical or personal interest. The selectivity can also take a form that information that is conceived to threaten the organization's own position (change, disruption) is concealed and kept away from the decision centers.

The goal conflict of the organization theory is compared with two situations that describe the climate in the organization or the management's view of his employees: Theory X-situation (work tends to be disliked and this must be compensated for with control measures from management), and theory Y-situation (p.182) (work attitude is positive and the individuals will themselves find optimum routines and exert self control if management defines goals for their activities). In a theory X - situation selectivity will be self protection as response to a high control

pressure. In a Theory Y - situation one can predict a higher degree of cooperation in entering and disseminating information from the employees. Selectivity from a varying coalescence between the organization's goals and individual goals and interests could occur, however, to the same degree as in a concern with Theory X - climate.

The next perspective of MkIS that is discussed is MkIS as an innovation. As such the introduction will induce predictable reactions that reduce employee morale, subtle forms for sabotage of the changes, antagonism and lack of cooperation. People whose previous work routines is affected by the introduction of a MkIS, could react in this, mostly negative manner. In the development work this will have consequences for the system analyst that is mapping out information flows and information requirements. Poor cooperative attitude and disinformation has been registered. The conflict is unavoidable and does not have to be negative, if it is real, and not emotionally qualified.

Piercy (op.cit.) finally pointed out in his work two organizational conditions that can create difficulties in the development stage (system analysis) and drift (inflow of information) of an MkIS. First, it is noted that to be in possession of information represents status and in some cases power for the individual that has the information (assuming a certain exclusivity). Individuals that have this position in an organization will be able to work against the introduction of an MkIS since the result will be reduced status and power. Second, it will be sources of conflicts between the individual (p.183) functional divisions in an enterprise. For example, marketing, finance, production, storage, personnel. The results of these conflicts can be cutting of information streams, twisting of information or reduction of information that can initiate, or be tied to conflict. Another case is the competition between divisions for influence on decisions made by top management. This influence is tied to information of various character.

Ives and Olson (1984) attempted through a review article to

test what they call an axiom within the MIS - literature; namely that user participation is necessary to be successful in developing a good decision support system or information system. The basis is that the authors have not found that results from research on factors that decide which system is perceived to be successful and which can be considered to be more or less a fiasco, have convincingly identified user participation as decisive for success or fiasco.

The positive effects of user participation are meant to apply to the quality of the system and ease the implementation. More concretely, the quality could be improved by:

1. More accurate and complete determination of the user's information requirements.
2. Make available expertise on the organization the system is to support. This expertise is not available to the same degree within the system development group.
3. Development of unacceptable or non-important functions of the system is avoided.
4. It improves the user's understanding of the system.

User acceptance is increased or made easier by: (p.184)

1. Realistic expectations to the possibilities of the system are developed.
2. An arena should be available where users and system developers can discuss design and solve conflicts.
3. It reduces user resistance to change.
4. Creates user commitment to utilize the system
5. Leads to the users developing an owner relationship to the system.

Regarding who should participate in the development work, the view has been that the users, i.e. those that directly use the system or the information from the system, or top management should be involved. Other groups that have been mentioned in the literature are suppliers of information to the system.

Characteristics of the system to be developed are also used to determine if user participation will have a positive effect on quality or acceptability. Some systems require a high degree of technical knowledge during development; other systems produce information that is invisible or relatively unimportant for the users and still others are very structured and well defined to start with. The development of systems with these characteristics will not be made easier or be improved to the same degree through user participation. Acceptance of the system by the users could, however, be made easier.

User participation is especially recommended for a system where acceptance is a critical factor, or where the developers are dependent on information that is only held by the (p.185) users or the target group. This applies especially to decision support systems where detailed information from the users is required (on details in the decision process that are to be supported) and where use to a high degree is voluntary.

Another factor for user participation is that the introduction of an information system will by necessity change the work routines of the user, and is therefore potentially subject to resistance (compare theory on planned organizational change). In line with this there is underway a redefining of users work areas in parallel with development and implementation of the information system.

The effect of user participation is also dependent on which stadium in the development process the user is included. User participation seems to have the greatest effect if it occurs in the introductory phase, when the area to be covered of the information system is defined, and when the first specification takes place. When the process has come so far that hardware is to be installed, a positive effect of user participation has also been registered.

A study of six studies of the connection between user participation and the quality of the system showed that in only two cases could such connection be established.

One of six studies concluded that there was a connection between user participation and the amount of use the system had later when implemented. Another study found a connection between user participation and how the system was used, but not with how much it was used. One of seven studies found that user participation was correlated with satisfaction with the work, the quality of the work performed, originality of work, job status and wages in one or more of five organizations that were studied.

In 12 of 22 studies, an investigation was made of a possible connection between user participation and satisfaction with the information available (volume and quality). In five cases there was a positive connection and in four cases the results were mixed.

With respect to studies on the connection between the effect of user participation and the nature of the system or the nature of the organization, a common hypothesis has been that user participation will be more important the less structured the decisions are. This hypothesis was not confirmed in two studies (see also Edström) (op.cit.)).

User participation has been recommended against due to conflicts generated between user representatives and system developers. A study found that the number of conflicts decreased throughout the project phase, and that conflict solutions increased during the work with the system development.

Ives and Olson conclude that the results do not demonstrate a strong connection between user participation and the ultimate fate of the information systems. The reasons for this are attributed to weak theoretical foundations for hypothesis formulation, methodological problems and measuring problems with the variables that are to describe the causative relations (i.e. the modelling).

INFORMATION SYSTEM - AND DECISION MAKING ANALYSIS

METHODS FOR STUDYING INFORMATION NEED AND SYSTEM DESIGN.

CONTENTS

		PAGE
1.	INTRODUCTION	185
2.	MIS, MkIS, DSS AND EXPERT SYSTEM- A CONCEPT CLARIFICATION	186
3.	METHODS FOR DEMAND SPECIFICATIONS AND DESIGN	190

1. INTRODUCTION (p.189)

Management information systems, (MIS), marketing information systems (MkIS), decision support systems (DSS), expert systems and other forms for artificial intelligence all have an extensive development phase. It is in the development phase that much of the groundwork is laid for successful implementation and satisfied users. The approach to demand specification and design of the system is different from system type to system type. A management information system will focus on information flow and information requirements in the user. Much of the work will consist of studying which reality models the user works from and carry out the design of the system such that the information that is made available through the system is organized around factors emphasized by management in decisions and evaluations.

The development of a decision support system will be made with basis in analyses of the decision behavior of the user.The goal is either to build up a system that can support the user with necessary information in the individual phases of the decision process. A more ambitious goal is to change the decision process through system use if weaknesses in the decision behavior have been demonstrated in the analysis.

Expert system and artificial intelligence are developed by having the knowledge of an individual or research results built into a system in the form of information, analytical models, decision processes or other forms for algorithms.

A number of methods and combination of methods have been suggested for establishing the information requirements for constructing an information system or a decision support system. A study like this is the first phase in the development work, after a broad functional area for company management has been chosen as the work area that the system is to support (p.190) and/or automate. In this literature study we discuss some methods that have been tested and suggested for development of information systems. For closer study and evaluation of a certain

method (Stabell 1983) we refer to Lines (Lines 1986a).

2. MIS, MkIS, DSS AND EXPERT SYSTEM - A CONCEPT CLARIFICATION

Management information systems, marketing information systems, decision support systems and expert systems all have the same primary goal, namely to ease or improve work tasks and especially decisions made by top - and middle management in an organization (usually a commercial concern). All system types have as basis that one of the most important contribution factors in management activities is information. Management information systems have as their goal to cover these information requirements, or defined parts of the information requirements, usually in that new information, or information organized in a new or better way, is made available through an EDP - based system.

The figure below shows a diagram of the individual components in a management information system.

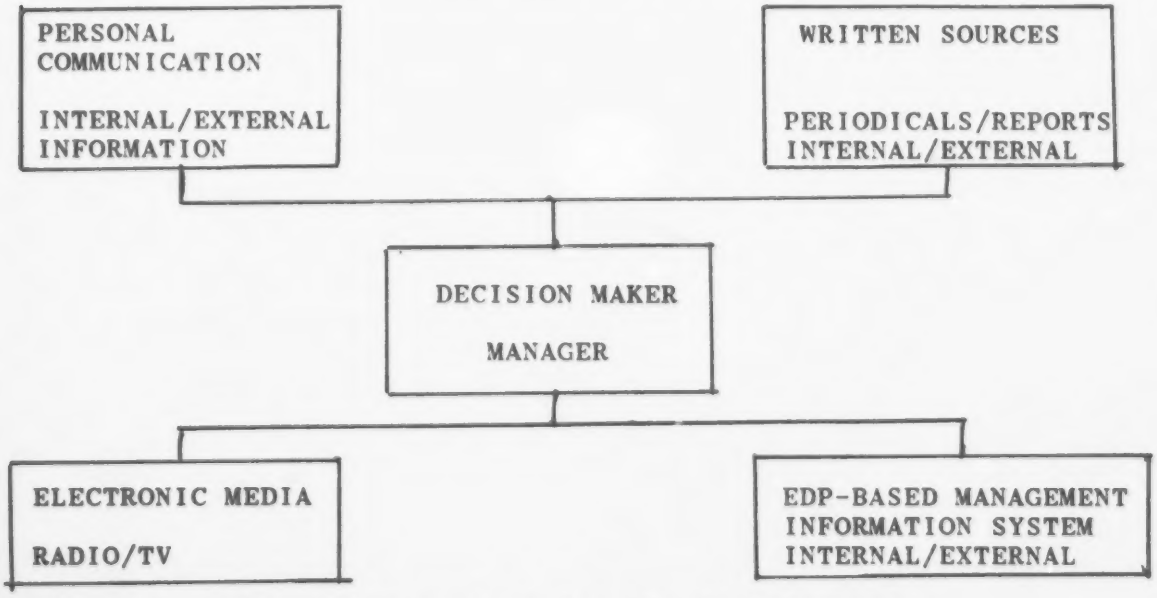


Figure 1. Information sources for the decision maker.

The decision maker will normally have his/her information requirements covered through combining information from personal communication with technical personnel internally in the concern and external technical personnel , colleagues and other individuals in the contact network that can contribute with information either ad hoc for a certain problem, or more continuously on a routine basis, with information from internal and external printed sources and from electronic media.
The purpose of the management information system is to collect and systematize information around the subjects the decision maker feels is of importance for decisions and other functions performed (for example competitor monitoring/ market monitoring).

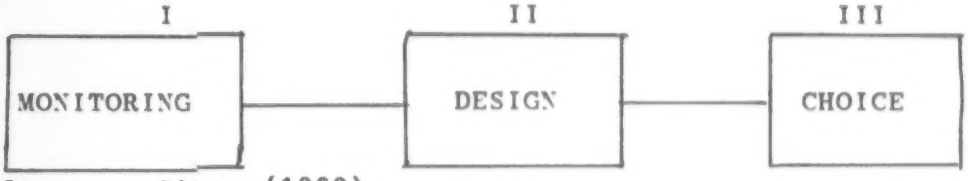
The strengths of an EDP - based information system as compared with the other components in the management information system are (or are attempted utilized in) that the user gets as much information as possible through one and the same media, and the information is organized and compiled around factors that are relevant for the functions carried out in a certain sector, and that the information is rapidly and easily available due to the reaction time of the electronic media. A further development of management information systems is that they are made interactive to a limited extent through user interface. The user interface makes it possible for a user to sort the information from more specific requirements.

A marketing information system (MkIS) is constructed in a similar way as the more general management information system, with the difference that the information that is entered into the system is chosen and organized in relation to the functions performed by the marketing department in the concern. The difference is therefore based on differences in functions performed by the users and that will give origin to differing information requirements.

Decision support systems can be seen as a further development of the more passive information systems in that the

whole, or parts of , the decision process is modelled and entered into the system. A decision process can schematically be divided into several phases or steps, and the decision support system makes information available that is adapted to the requirements of the individual steps of the decision process.

The figure below shows schematically the individual steps in a decision process. The division into three steps or phases was first identified through a systematic study of decision making in concerns by Simon (1960), and has been much used as a basis for development of management information systems and decision support systems (see f.ex. Stabell (1983) and Olson (1985)).



Source: Simon (1960).

The monitoring phase or - function is a more or less continuous function where the manager and/or decision maker let themselves be exposed to a number of sources of information and the environment; both the internal and external, the micro environments (participants in the market) and the macro environments (participants and events outside the market, but with effects on the concern). The purpose of the exposure is to detect situations or conditions that may mean problems or threats or opportunities for the concern.

The design phase includes activities to study alternatives, i.e. alternatives for solving problems or to capitalize on opportunities as a result of the situation that was "discovered" in the monitoring phase.

The consequences of the various alternatives available are also studied in this phase. The phase can logically be divided in two:

========> Listing alternatives =======> Studying consequences===>

The choice or selection phase contains a choice of alternatives where the consequences of each individual alternative are compared with a preference function (f.ex. which alternative will give best profitability given the risk profile and marketing strategy), and the alternative is chosen that is best relative to the decision makers preference function.

The pure monitoring phase is a job for the management (p194) information system (both the EDP - based and the other components). A decision support system focus on the problem solving phase itself, i.e. phase II and phase III in Simon's classification. It is therefore very important to collect detailed information on the decision process in order to model this so that the system can offer information that is organized according to demand in the individual phases. For example, if the choice being faced is the composition of businesses for a marketing trip to a new market, the job of the system is to bring information on customer opportunities, i.e. information on attributes of individual concerns emphasized by the manager in the assembly of the customer portfolio, corresponding to "mapping out alternatives and studying the consequences".

For certain types of decisions the system also gives support in rating the alternatives, and the choice itself (phase III).

A further development of a decision support system involves entering a normative modelling of the decision process into the system. The basis is a descriptive modelling, i.e. a modelling of the decision process as it is actually performed by the decision maker. In normative modelling, technical knowledge in the functional area to be covered by the decision support system (for example finance or marketing) can be built into the system. In this way the decision process can not only be made more effective, but also qualitatively better, for example by having more alternatives evaluated or more attributes entered into the

evaluation.

In principle an expert system and artificial intelligence is a continuation of the normative modelling in that decision processes are modelled to such a degree that demands on the technical knowledge of the user are reduced to being able to operate the computer. The intuitive weighting of individual factors necessary for use of a decision support system (p.195) is unnecessary because it has been done explicitly by experts and is available in the system as models.

3. METHODS FOR DEMAND SPECIFICATION AND DESIGN.

Decision analysis as a basis for demand specification and design of a decision support system has been discussed in detail by Lines (1986a).

Keen (1980) gives in a paper some guidelines on how analytical models and technologies based on business economics can be incorporated in a decision support system in a manner that makes them usable for the users. There will usually be a considerable problem to get a practitioner to use complex analytical techniques in decision making, first because the users do not have technical competence making them familiar with , for example operational analysis; second, because use of the technologies has been so elaborate that the ratio effort/benefit has been for intuitive weighting and choice between alternatives.

The conditions for a successful development of BSS is that it must be designed from a users/managers perspective, on detailed knowledge of the decision processes used and on characteristics of the organizations or concerns where the system is to be implemented.

The task of a DSS is limited to job tasks and decisions that can not be made routinely, and it supports rather than replaces the evaluation made by the manager. An important assumption in

the development of a decision support system is that one can not improve processes that one does not understand. Furthermore, the decision maker will stay with his rule of thumb approach rather than a more systematic and exact evaluation of factors if DSS is unwieldy, unreliable, unavailable or difficult to (p.196) understand. A DSS must be reasonably easy to use, dependable, easily available and easy to understand if it is expected to be used.

Keen presents a DSS that has been developed to support a marketing manager called BRANDAID. Among the tasks of the user are to determine prices, sales promoting measures, advertising budgets and sales effort for a product. The marketing manager has used certain assumptions about the levels (in kr.) for each of these efforts, and sales. Due to the heavy workload needed to forecast the sales of each combination of efforts, only a few combinations were studied before the budgets for each of the activities were established. DSS for this task was developed by having the relationship effort-sales (the response function) made explicit through cooperation between user and system developer. The response function for each effort was entered into the system, and were next (through the use of DSS) used to calculate the effect on sales. Some general conclusions were drawn with respect to which tasks the system developer must perform:

1. What are the decisions or work tasks to be supported?
2. How doe the user perform the task?
3. What information does he use; in what manner?
4. What does it mean to make the process more effective?

The author points out that operational analysis and forecasting technologies, that are technically complicated, but have outputs that are easy to understand and are meaningful (197) for the user, can be hidden in the decision support system behind a simple command, for example "compare" or "project". In this manner the decisions can be improved through evaluation of

several alternatives and better elucidation of the consequences for each alternative. Several conclusions are drawn for the system user:

1. The user has the right to demand simple commands that will give simple answers from the system (f.ex."project")
2. A DSS can be constructed with commands that correspond to those the manager would use if one of his employees was carrying out the calculations.
3. It is the user and not the system developer that leads the development process. Especially important in development of the user - system dialogue.

Keen stresses the division of work between user and BSS. Some of the decision process can be made by the system and some by the decision maker. Not all evaluation can be formulated and be solved explicitly.

King and Clelard (1975) describe a method for demand specification and design of MIS where they attempt to integrate two considerations: 1) development of a system that disseminates information that is close to the user's real information requirements and 2) that the user is included in the development process.

Studying and identifying which information the decision maker and/or user has a need for has turned out to be a methodological challenge and one of the main problems in the development of an information system. Several authors have further emphasized the usefulness of, and the need for, including the users in the development work. The purpose has been to identify information needs and develop forms of (p.198)
representation and interface through interaction between the system developer - demonstration solutions - user. There will furthermore be a learning effect through this cooperative effort that will make the implementation easier.

The method is more heavily dependent on user participation,

also for jobs of a more systematic type, f.ex. the basic design of the system (which information modules in the database, which model representations of problems, which optimizing models). One of the consequences is that output from the system (information or results from sensitivity analyses etc.) are evaluated, not only from a usefulness - cost perspective, but also from the user's more or less subjective perception of the use of the information system to him. The philosophy behind this is that a technically optimal system that is not being used is a poorer result than a technically deficient system that is perceived to be useful by the user. It is the net effect of the system on the decision maker that it is desirable to maximize.

The development process has eight steps or phases:

1. Making a survey of users and external organizations that are either suppliers of information, or are users of the system.
2. Making a survey of decision areas that can be supported.
3. Defining which decision areas and work areas that the system should be developed towards.
4. Developing a descriptive model of the system (i.e. which participants are involved on the user- and supply side, lines of authorization, areas of responsibility etc).
5. Developing a normative model of the system. (p.199)
6. Developing a consensus model of the system (attempt to reorganize and reformulate so that organization and processes will be closer to the normative model.
7. Identifying and specifying decision model used.
8. Specifying information requirements.

In the first phase, identification of decision areas, it is recommended to use as basis relevant theories for functions in the business, for example marketing, storage, purchase, financing, personnel and others or parts of these functional

areas. The basis is abstract, but is made more concrete through cooperation with management. The advantage of the method is that important functional areas are not left out and not evaluated. There is therefore a good theoretical foundation for the development process (which makes it possible to draw on well developed theories also in the other phases of the development process) and confusion with respect to differences in terminology is avoided.

The definition phase (2) is a continuation of the first phase with a more detailed discussion of each individual decision area to describe the processes that occur. This phase is not worked out in too much detail,because many of the functional areas will be rejected, and the work will then to a high degree have been wasted.

In the third phase, a detailed description is made of participants and participant groups that will have any connection with the system internally in the organization or externally, either as a user or as a supplier of information. A detailed description is given of authoritative relationships, areas of responsibility and roles for each participant and/or (p.200) section and for each work task, as they were specified in Phase 2. As an aid in this process, a technique is used whereby a matrix is developed where tasks are related to participants.

The method gives an insight into who does what in the organization, interaction between the individual units in the organization and between internal and external units, a general outline of the type of information needed, directions of the information streams at the present time, and in which manner the information requirements are generated.

In the two next steps, a normative model is developed for how the system should be constructed with basis in theory for the functional areas that are to be supported. This is the first introduction of knowledge into the system. In the next step, a trade off is made in conjunction with management between which system that would be desirable and which system is possible

(consensus modelling of the system).

In the next phase, concrete data are collected on the decision models the users are using in the two individual decisions. This can be done with the help of interviews where the users are asked to reconstruct which attributes are emphasized, and then which weight each attribute is given relative to a preference function. The task of the system is then to offer informat on these factors, or if it possible to quantify attributes and preference function, to include a model for calculating the goal and choice between alternatives. A test of such a method for decision analysis is reported in Lines (op.cit.).

The last step in the development process is to specify which information is necessary for the decision maker to make (p.201) decisions as specified in the previous phase. This phase includes evaluations of various sources.

Yadav (1984) discusses in a review article some methods to determine information requirements in organizations. The article does not discuss methods for design of information systems, which is the next step in the development process, but a system constructed around the information requirements as they can be determined through the methods described. Establishment of information requirements is made difficult in that the system developers assume that the managers know their requirements, and that they are able to articulate them in a manner that means that they can form corner stones in an information system.However,the experience has been that decisions are made in quite an intuitive and implicit manner, and that managers rarely take time to reflect over their information requirements in an explicit manner. Another difficulty is created by having the managers assume that the system developers are able to understand information requirements and solve these through the development

of the information system.

The process of mapping the information requirements in an organization starts with a study of structure (construction) and of the processes occurring in the organization. The information requirement is generated by the processes that are performed, or more specifically, the functions and responsibility areas that the manager and/or user is responsible for. These are in again a result of the structure in the organization. An understanding of the information requirements require an understanding of the organization and the management functions to be performed, and should be supported through the information system. Some of the research to understand and categorize managers, organizations and decisions will be discussed in another paper. The most (p.202) relevant study in this field is by Anthony (1965) that characterizes the decisions by levels as operative, tactical or strategic. The decisions differ from each other with respect to which information they require. Simon (1960) analyzed decision processes (compare p.4) and introduced a decision typology: Structured vs. unstructured decisions, with a basis in whether established explicit routines or algorithms to carry out the decisions were established. Gorry and Scott Morton (1971) have developed a framework for MIS - development where they combine Simon's and Anthony's decision typologies and draw implications for the development of an information system (discussed below).

Mintzberg (1971) and Mintzberg et al (1976) have developed a typology for organizations based on processes and problem solving in the organizations, in addition to a study of the structure in "non - structured decisions".

Yadav (op.cit.) promotes some demands to good analytical techniques, and point out the weaknesses in each of the suggested techniques discussed. The discussion is too summarized to enable us to evaluate the methods just from the article.

Colter (1984) carried out a comparative study of different system analysis techniques. He first states that the evaluation of system analysis techniques must be based on th intended role of the system analysis. Here there are two definitions that focus on the different parts and/or functions of a system:

1. Couger's (1973) definition focus on the requirement for specifying input to the system, the processes and decisions that take place within the system, and output from the system.
2. Winberg's (1978) definition focus on the necessity to know, specify and understand the components in the system and the relationship between them.

The definitions complement each other in that both structure and functions, input and output must be studied in order to be able to come up with a demand specification and to formulate an information system based on the demand specifications. Colter (1984) gives a list of evaluation criteria with respect to important moments in the analytical techniques that have been proposed. These attributes are given in the figure below.

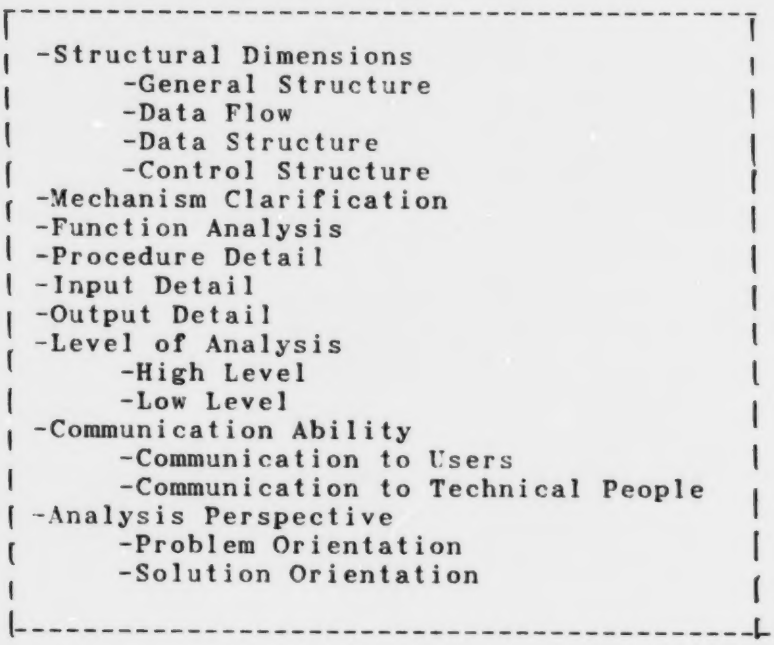


Figure 2. Evaluation criteria for system analysis techniques. From Colter (op.cit.)

The development of system analysis tools has gone through five phases which began in the pre - computer era, when they had to go through manual operations in a systematic manner with a view of identifying operations that could be improved or be made more effective. The techniques have gradually been adapted to data-based solutions by focusing on computer methods to analyze and solve problems and to automate processes. The pre - computer tools consisted of several forms of flow diagrams of various complexities and ability to detail components, relations and functions in the system to be analyzed. The weakness of these methods was that they did not describe the structural side of the system; i.e. general structure (between the components of the system), data structure (between the individual components in the data requirement and the control structure (i.e. which procedures that are being performed in the system). The most

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advanced flow diagram techniques specified some of the general structure in that both functions and participants were specified in a matrix (compare p.6)

First generation computer oriented techniques focus on the EDP - based part of the system without describing interface with people on the input and output (I/O) sides. The techniques describe input in the form of data, mechanical procedures internal to the system and output from the system in detail. One of the problems with these techniques were that they hampered communication of the manner of operation of the system between user and system developer.

Second generation tools are characterized by decisions being analyzed more in detail, and that packages of analytical techniques are developed that collectively cover most of the dimensions required in a complete analysis and description of a system, including a discussion of important external factors that affect the system without being a part of it.

Third, fourth and fifth generation tools focus on different structural sides of a system. The methods are built up as packages to cover the individual sides of the system description, and some also discuss the input -process - output parts (IPO) in quite some detail with the help of the methods developed in earlier generations.

The author concludes that traditional and structural methods must be combined to be able to encompass all relevant sides of the system.

Gorry and Scott-Morton put the spotlight on the close connection there is between management activities and management information requirements. The purpose of an information system is only to support decisions, and they therefore find it useful to classify the activities of the managers based on the decisions taken. In the first instance the work tasks are divided into:

1) Strategic planning, 2) Management control and operative control according to Anthony's categorization of the duties of corporate management. Strategic planning deals with the company's long term adaptation to external framework conditions (in micro and macro systems), operative control is carried out to ensure that individual tasks are performed effectively with respect to the way they are being performed and efficiently with respect to use of resources.

The authors point out that there are fundamental differences in which type information required for the different activities. Strategic planning requires aggregated data on external conditions. Operative control requires up-to-date information on individual conditions and individual processes on a continuing basis. The authors also claim that information for operative control is mainly generated internally in the organization; however, this will depend on sector and functions performed in the concerns (f.ex. exports of fish).

The authors argue that three separate systems can be built up to support these activities. The view that there are strong linkages between information to each management level, and that an integrated system ought to be constructed where output from the operative level is included as input in the other parts of the system, is attacked by these authors.

Simon's (op.cit.) decision typology and description of the phases of the decision process gives an insight into how the problem solution takes place in the organization. The activities are divided into structured and non-structured decisions according to if there are already developed procedures for performing the individual steps in the decision process. Non-structured decisions can not in advance be solved with the help of algorithms for problem solutions, and the solution must be based on available human resources and knowledge in the organization.

The authors point out that up to that time (1971), most of the work on MIS had bee concentrated on structured decisions on

the operative level. Most of the work of managers can , however, be characterized as non-structured decisions at a higher level, so that there is a poor correlation between information and information requirements, and the system has little influence on the managers work. Another point being made is that non-structured decisions are structured during the work with the problems so that over time there will be a migration of the decision mass towards the structured category. This process occur by accumulation of knowledge in the organization, and by accumulation and development of knowledge through the international research environment.

In general it can be said that in the development of information systems for structured, operative decisions, the work will be to implement known models in a given organizational context, while development of an MIS for non-structured (p.207) decisions require focus on development of the model itself.

To improve the quality of the decisions being made, effort can either be directed towards improving the quality of the information the decisions are based on, or the effort can be directed towards improving the decision process. The authors feel that managers have more need for understanding which processes must be performed to process the information, than a need for more and more exact information.

(p.208)

DECISION MAKING PROCESSES AND - CATEGORIES

CONTENTS

		PAGE
1	INTRODUCTION	204
2	CATEGORIZATION OF DECISIONS	205
3	DECISION MODELS AND - PROCESSES	206
4	STRUCTURED AND NON-STRUCTURED DECISIONS	211
5	STRATEGIC, TACTICAL AND OPERATIVE DECISIONS	213
6	DECISIONS CATEGORIZED BY FUNCTIONAL AREA	214
7	AN INTEGRATED FRAMEWORK FOR DECISIONS	216

1 INTRODUCTION - WHY A FOCUS ON DECISION MAKING (p.210)

Among the most important of management functions are to make decisions of different types. The decisions will in the next instance be implemented by subordinates. The part of the activities of the company that can be observed, either purchase, storage, processing, personnel or financing, are the results of decisions on the management level. The decisions can for example be arranged in a hierarchy, with the strategic decisions on the top of the hierarchy and the operative decisions on the bottom. The relationship between the individual levels is that decisions on a higher level set limits for decisions on a lower level.

The most important effort factor in decision making is information. Decision making is an interaction between information, information processing and knowledge. The information needs of a manager or a firm are therefore closely tied to which decisions are made, and the decision processes that lead to a choice.

Knowledge of and an understanding of decision making and decision processes is therefore important in demand specification and design of information systems. How the decision behavior places demands on the information systems, and how knowledge of decision making is made use of at the individual stages in the development of an information system, has been discussed in two earlier papers (Lines 1986a and 1986c). Decision analysis techniques form some of the methodology for the development of information systems.

Decisions being made, and thereby the concrete information needs of a firm, are dependent on sector specific, institutional and structural conditions in the sector. There are still a number of fundamental features of decisions and decision making (p.211)
that to a large extent are associated with functions in the firm in general and behavior of people in problem solving. These conditions will always apply, also for firms in the seafood

industry. The results from decision research has to a large degree been integrated in the formulation of information systems because increased understanding has been obtained of the use of information and need for information in firms and organizations generally. The goal of this literature study has been to summarize the main results from decision research. These results comprise an overview over which opportunities can be chosen as goals for the system development, in addition to that they are central in the specification of functional demands for an information or decision system.

2. CATEGORIZATION OF DECISIONS

Decision researchers have found that it makes sense to introduce categories of decisions. As with all categorization the purpose has been to divide the decisions into classes where each class consists of decision types that are alike with respect to certain characteristics. The criteria that have been used are:

1. To what degree has established routines been available in advance to implement the decisions or not.

This dichotomy (structured/non-structured decisions), was introduced by Simon (1960) and has been much used to study characteristics of the management functions in a firm.

2. What functional areas in the firm the decisions belong to.

In most firms (producing goods) similar functions are being performed: Purchasing, storage, processing, marketing, (p.212) accounting/finance and personnel. The weight given to each of the functions varies between sectors and between firms in one and the

same sector.

3. Dividing decisions into three depending on which level in the management function the decisions belong: Strategic, management control (tactical) or operative control.

The trichonomy was introduced by Anthony (1965) as the result of a study of management work tasks.At which level the decisions are made has a considerable influence on the information they require in several dimensions.

In this paper we will discuss in relative high detail the characteristics of the various categories of decisions and point to conditions in each category that is of importance for demand specification and design of information systems and decision support systems.

3. DECISION MAKING PROCESSES AND - MODELS

We will first go through some of the results from research on how decisions are made in organizations. The research on human decision behavior has identified more or less distinct phases in the decision process. Each phase has its goal or its result that the further process builds on. Each phase comprises a part solution of the problem and has therefore its specific information need. An a priori description of the individual phases in the decision process will not give the information requirements directly in a given situation, for a certain firm or sector, but serves as an aid or search form to identify the information need.

We will first describe two alternate sets of assumptions and premises for decision making. The neo-classic economic model for decision making assumes that:

1. All alternatives are known and that all results of these alternatives are known (i.e. decision making under security).
2. The decision maker attempts to maximize profit or use.
3. The decision maker is extremely sensitive to differences in use between the results.

The economic model has been shown to give a relatively poor description of how the decision making actually proceeds in most organizations. Simon (op.cit.) therefore took this model as his basis, but has modified it considerably to come closer to the behavior that can be observed in real life organizations. The Simon model is more descriptive, while the economic model can be perceived as a normative model and gives a very idealized picture of reality. Simon's model gives the following description of the decision behavior:

1. The decision maker does not know all alternatives or all results of the alternatives.
2. The decision maker carries out a limited search to discover some satisfactory alternatives.
3. The decision maker makes a decision that satisfies his aspiration level.

This description of decision making is in the first instance more realistic, and secondly, it places more achievable (p.214) demands on a system that is to support the decision maker (f.ex. abandonment of demands that the best alternative shall be found and the consequences of this shall be made clear).

Cyert and March (1963) have taken Simon's model for administrative decision making as their origin , and have developed a theory for organization behavior in connection with decision making. The theory describes some important methods used by organizations to function under security. First, it is a commonly observed technique that decision makers make decisions

where the outcome becomes known relatively quickly. In this way the assumptions the decisions were based on are confirmed quickly, and one is also able to change course before the damaging effects become too great. A such avoidance of uncertainty is, however, a strong source of sub-optimal decisions, since alternatives that are perceived as risky due to their long term character, will not be evaluated. A good supply of information on relevant sides of such alternatives could reduce the perception of risk and lead to evaluation and choice of more optimal alternatives. Second, the lack of knowledge of alternatives and outcome of alternatives leads to the solutions of the problem and/or utilization of opportunities , as a result of changed assumptions, are sought close to the firm's existing methods of doing things. Solutions that involve a high degree of new thinking or change in the way things are done will seldom be evaluated. Access to information is one of the factors that can contribute to limiting the width and originality of the alternatives evaluated.

Simon (op.cit.) identified three more or less distinct phases in his study of decision making in firms:

1. The monitoring phase (Intelligence)
2. Study - and analysis phase (design)
3. Select between alternatives (choice)

The monitoring phase is a continuously ongoing phase where management are exposing themselves to a number of sources of information to uncover events, conditions or trends that require decisions and action from the organization.The phase can be performed at various levels of consciousness. Some organizations have built up extensive monitoring systems directed towards sectors or factors that are of special importance for the firm. Other organizations with poorly organized systems react only when the signals become so strong that action can no longer be avoided. Weighting of monitoring, and the sensitivity to signals

from information streams varies f.ex. with the situation the firm otherwise finds itself. Crisis situations and turbulence in other areas leads to reduced receptiveness of signals from the surroundings (Janis and Mann 1977). Radomsky (1967) pointed out a threshold for signals if they should trigger a response in the form of decision behavior, and that this threshold was raised for firms where pressure of work was high, and where management was surrounded by crisis-like conditions on a number of areas the firm was involved in. A manager that is surrounded by visible and non-threatening phenomenon, is more likely to search the environments for opportunities or problems that require action.

The sources of information for this phase are internal and external and consist of printed media, electronic media and personal communication with various participants (see Lines 1986c).

The parallel systems to this phase in the decision (p.216) process are the pure information systems that aim at generating information streams grouped around factors that are of special importance for the sector and the firm. Development of a system to support this phase requires especially that attention is directed to which factors are central (Critical Success Factors, Rockart and Crescenzi 1983) and towards presentation of this information in a form that makes it suitable for evaluation and decision making.

The information system can be divided into sectors where information from the individual sectors is integrated at the decision maker or in a computer. A market information system (MkIS) comprises a part of a total system where the sector covered is consumer/dealer sector, competitor sector and the part of the society sector that has influence on demand or competitors. The principal user of a market information system is the marketing division as a basis for strategy formulation, tactical planning, execution and control of the traditional marketing activities (price setting, choice of distribution channel, product development and formulation of communication

strategy and communication measures), but also the top management of the firm. In the seafood industry all these functions are performed by a limited number of people in each firm. The areas of use therefore do not refer to different people or divisions, but to work tasks that are often performed by one person or a few people.

The elucidation stage starts after a decision maker has registered an event or a trend (generally a situation) that require action. The situation can be classified as a continuous state from crisis/problem to a pure opportunity (Mintzberg et al. 1976). The registration of the situation in itself occur in that the decision maker uncovers a deviation between the status of the conditions being monitored and given expectations or desired status for these conditions. The expectations or the standard the events are evaluated against can be given from four sources (from Pound 1969):

1. Historic models where the expectations are extrapolated from earlier experiences with the same situations.
2. Planning models, where the events are evaluated with reference to a plan worked out by the organization (budget deviation).
3. Models in use by other individuals in the organization (superiors, subordinates, colleagues or other divisions).
4. Models in use by participants or participant groups outside the organization (competitors, customers, sector or trade organizations).

The activities in this phase consists of closer analysis to increase the understanding of the problem. The situation that started the process can be registered through very aggregated or indirect signals. An example of such a signal can be a registration that prices achieved in a marked are not up to expectations, or more specifically, not up to budgeted prices.

The first part of the elucidation or analysis phase will then be to collect information with a view of identifying and understanding the factors that have led to the price reduction.As a result of this analysis, the conclusion can be that the reduction is of temporary character and will not require action by the firm. Alternatively, the understanding of the events is being increased, and the firm is better able to identify possible action patterns as response. Identification of possible action alternatives and analyzing the consequences for each (p.218) alternative with respect to a given set of attributes is part of the elucidation phase.

The last phase in Simon's model is choice between possible alternatives.

Rubenstein and Haberstroh (1965) have expanded Simons model with two phases that follow the selection phase:

4. Communication and implementation of the decision.

In this phase the decision is marketed to people in the organization that, in one way or another, will become involved in the implementation of the decision, and that details regarding the implementation are decided on.

5. Follow up and feedback of the results of the decision.

---

4. STRUCTURED AND NON-STRUCTURED DECISIONS

The dichotomy was first introduced by Simon (1960) in the classic " The New Science of Management Decisions". A decision is said to be structured (or programmed) if already developed procedures are available for carrying out the individual phases of the decision . Non-structured decisions are characterized by

the fact that they must be handled as new each time they are made, and that there are no routines, programs or other forms for algorithms to carry them out. Therefore these decision problems must be solved with the help of the general knowledge found in the organization or in individuals.

Several researchers that have worked with decision (p.219) support systems and management in general, have observed that most of the work tasks performed by managers can be categorized as non-structured decisions (f.ex. Gorry and Scott-Morton). Decisions made on the strategic level will especially be characterized as news, both with respect to stimuli that induces the decision, analysis of the problem, elucidation of alternatives and selection. The closer one gets to the operational level, the more the decisions will appear to be structured. The decisions are made within the framework of working conditions in and outside the firm (technical, economic, structural and institutional) and often follow procedures that are developed in advance in the firm, or by external experts. The operative decisions, that apply to the daily operation of the firm, are repetitive and are more suitable for automation since they can be taken from a set of relatively stable and unambiguous criteria. The strategic decisions, however, are characterized by the fact that a choice must be made from a knowledge based and overall evaluation, with unclear optimalization criteria and uncertainty with respect to the outcome.

Gorry and Scott-Morton (op.cit.) categorize decisions as structured when there are procedures developed in advance for all three (five) phases in the decision process (Intelligence, design, choice). Decisions are categorized as semi-structured when routines exist for less than three phases, or perhaps lack the advantages of one or several phases.

Mintzberg et.al. studied 25 strategic decision processes in American industrial concerns and found that the processes were characterized by news, complexity and uncertainty with respect to the outcome. The process begins with little understanding of the

decision situation and the road to a solution, and only a vague idea on what the solution will be and how the solution (selection) is to be evaluated when it is developed.

5. STRATEGIC, TACTICAL AND OPERATIVE DECISIONS

The division into three as strategic, tactical (management control) and operative decisions (operational control) was first observed and introduced into the literature by Anthony (op.cit.). The trisecting is not absolute in the meaning that decisions can be placed only in one category. There are not distinct limits between the categories. The division is still operational since it picks up the characteristics of the various job tasks performed by a manager, and therefore clarifies differences between the various tasks.

It is the strategic and operative decisions that have been given the most attention in research environments and in business economics literature. The tactical decisions have been studied less, and relatively little is known of the decision processes here.

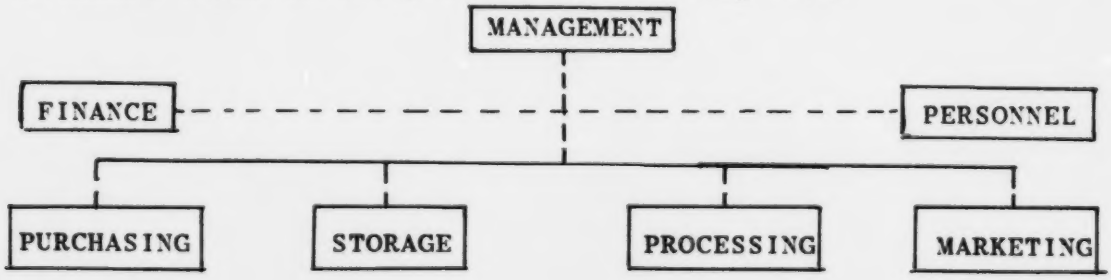
Strategic decisions apply especially to policy formulations in the firm. Mintzberg et. al. were satisfied with defining strategic decisions as important decisions without any further clarification. The strategy formulations and the strategic decisions is an attempt to position the firm relative to important events and limits in the environments (demand, resources, competitors etc.). The strategic area of work is long term by nature, both because the implementation of a strategy takes time, so that the situation description must apply to the future, and because a strategic selection ties up the resources of the firm in such a way that a change in strategy cannot be made right then. The information requirements for strategic

decisions and the decision process itself is characterized by this. The information used is aggregated and concentrated on external factors. The decision process is long term and complicated and requires top competence in a number of areas.

Operational decisions are decisions with respect (p.221) to the daily operation of the firm. The operational decisions are characterized by being repeated often under similar conditions, the consequences of the decisions are of relatively short duration and they are made within the framework of strategic and tactical choices that act as guidelines and limit the alternatives that are viable.

6. DECISIONS CATEGORIZED BY FUNCTIONAL AREAS

In many connections it is relevant to categorize the decisions made in a firm according to functional area. A processing firm can be divide into divisions according to the functions performed. A functional categorization of the decisions will then be according to the area of responsibility they belong under, and which individual that makes the decisions. In smaller firms the division is not necessarily in sections, but the functions performed can be compared with functions performed in the individual divisions in a larger firm. The functional division of activities and decisions follow the same pattern as a standard organization plan in a processing firm:



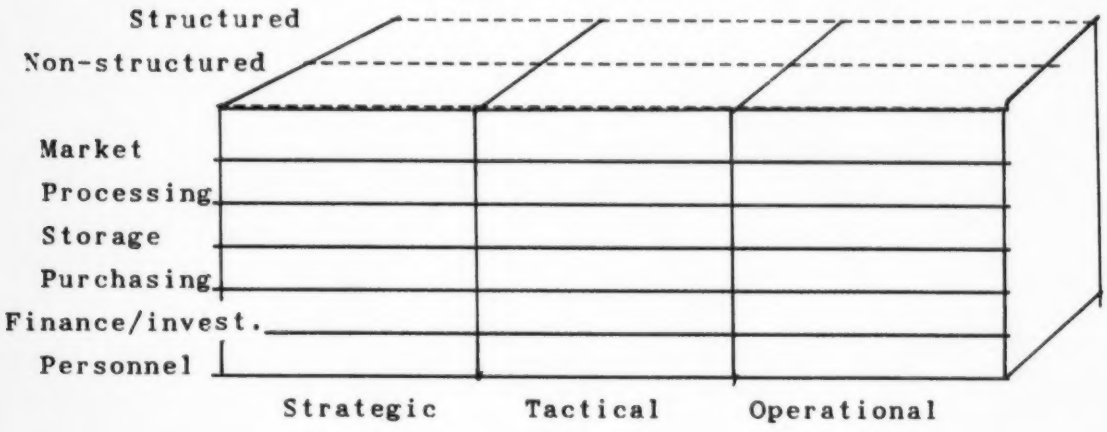
The figure shows the principal functional areas in a processing firm. Two or more divisions can be combined. The importance placed on the individual functions can also vary, both from firm to firm and over time. In the traditional seafood industry most of the effort in value added has been concentrated on processing. The marketing function has been relatively little developed, and for most firms it has been delegated to an external exporter. In longer periods with raw material shortages, the purchasing function has been given relatively little attention.

The figure shows a functional organization.. In a strongly market oriented organization , marketing can be placed in an area of authority between top management and the other divisions. In smaller firms this means that the market situation and signals from the markets to a large degree is included in the management of activities in the other divisions.

A functional division of decisions similar to this helps to clarify the choice of a development area for a decision support system. For a pure market information system it must be realized that market information partly forms the basis for decisions also within the other functional areas in the firm.

7. AN INTEGRATED BASIS FOR DECISIONS

By using only one set of criteria for categorizing the decisions, it is not possible to catch all sides of the decisions and decision processes that are relevant relative to the development of an information system or decision support system. For example, strategic, tactical and operational decisions will have to be made within the market of the functional area as well as within the other functional areas. Similarly there will be a different degree of structure in the decision processes from decision to decision. By combining the three sets of criteria, more relevant sides of the decisions will be included and one will thereby be able to draw on the research that has been done with basis in all three perspectives. In the figure below we have illustrated how the decision mass can be divided according to the three sets of criteria.



The figure shows the set of decisions one can have (p.225) as basis for an information system or a decision support system. Each decision will have its specific information requirement, its functional area and its degree of structure. All dimensions have clear consequences for the system development. Whether a decision is structured or non-structured, or the degree of structure decides directly the opportunities for modelling of the

decision process. As we have pointed out earlier in this paper, strategic, tactical and operational decisions place fundamentally different demands on the information they build on. Which functional area the decision falls under has large consequences for sources (f.ex. the marketing function is to a large extent depending on external data).

This integrated framework will be used in a later paper to identify decisions that can be a measure of development of a decision support system and/or market information system.

DECISION-MAKING SUPPORT SYSTEM FOR DISTRIBUTION CHANNEL DECISIONS

A ROUGH OUTLINE

CONTENTS

	PAGE
INTRODUCTION	220
DEVELOPMENT OF THE ANALYTICAL FRAMEWORK	220
THE ATTRIBUTES	227
1.Structural attributes in the choice of channels	
2.Attributes of individual firms within a category	
OPERATIONALIZATION OF THE ATTRIBUTES	233
A TOTAL MODEL FOR THE INFORMATION REQUIREMENT	234

INTRODUCTION

A key decision in the exports of seafood is the composition of the customer portfolio. Through the selection of distribution channels , an indirect selection is made of segments in the consumer and industrial markets, geographical coverage of the markets, risk profile, quantities sold on the markets, willingness to pay and product combinations on the markets.

In an earlier paper (Lines 1986a) we have discussed in more detail which attributes of the customers that are being assessed, which alternatives an exporter have with respect to links in the distribution channel and the type of firms. Also discussed were the principal sources available to the exporter in studying and charting alternatives and choice of customer mix. In this paper we will, based on these attributes and other conditions of importance in putting together a customer portfolio, present the development of a total model for the information needs of an exporting firm. This model forms the concrete basis for the next phases in the system development: The development of an information system (scrutinizing information sources, database- and interface design) for designing and operating the decision support system.

DEVELOPMENT OF THE ANALYTICAL FRAMEWORK FOR THE INFORMATION NEED

In the development of the analytical framework and which factors should be considered in the various participants within the distribution of seafoods, we will use as basis the structure of the information channels for seafood and marketing theories to decide which conditions should be given high priority in the assembly of a customer portfolio.

The structure in the distribution of seafood has a similar composition in most markets in western countries. Participants

are importing firms, agents, wholesalers, pure secondary processing plants, purchasing organizations for supermarket chains on the importer and wholesale levels. Participants (p.229) on the retail level are fish shops (fixed, movable, market dealers), supermarkets (unmanned freezer counters and cabinets, canned, semi-preserves and manned fresh fish counter), grocery stores (canned and frozen fish) and freezer centers. The segments in the last stage consist of the consumer segment, the restaurant segment and canteen segment.

The figure below shows a general distribution chart for seafood.

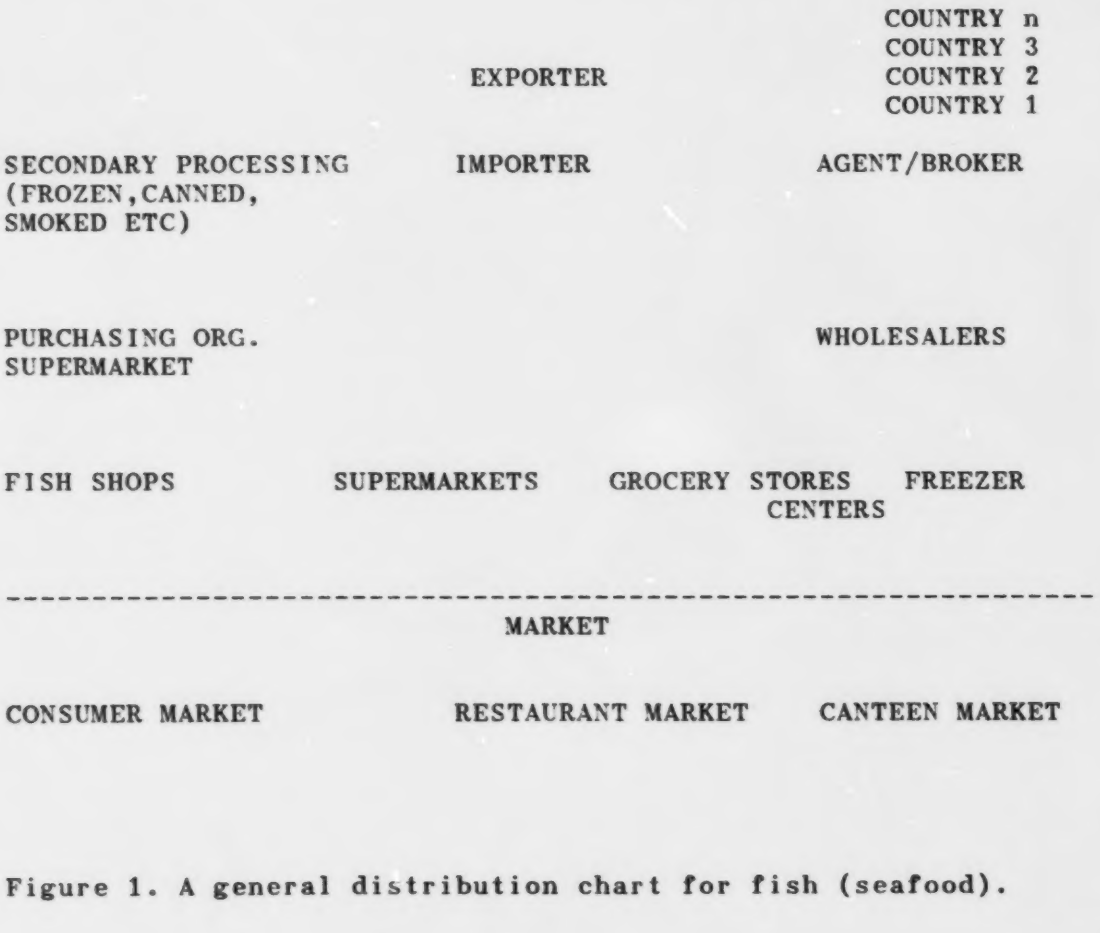


Figure 1. A general distribution chart for fish (seafood).

The distribution chart on the previous page is (p.230) really a combination of several distribution channels. One can distinguish between the fresh fish channel and the frozen fish channel in most markets. There is also a distinction between fresh fish channels and channels via smokers for salmon.

The relative importance of the two main distribution channels, fresh and frozen, varies from country to country and has as a basis the consumption habits, characteristics of the distribution (development of the freezer chain) and preferences with respect to fresh vs. frozen foods. At one extreme is the French market with strong dominance and strong preferences for fresh fish (seafood) (70% of the total consumption). In other western countries the frozen fish share is correspondingly high.

The figure below shows the distribution channels for fresh fish, frozen fish and salmon for smoking.

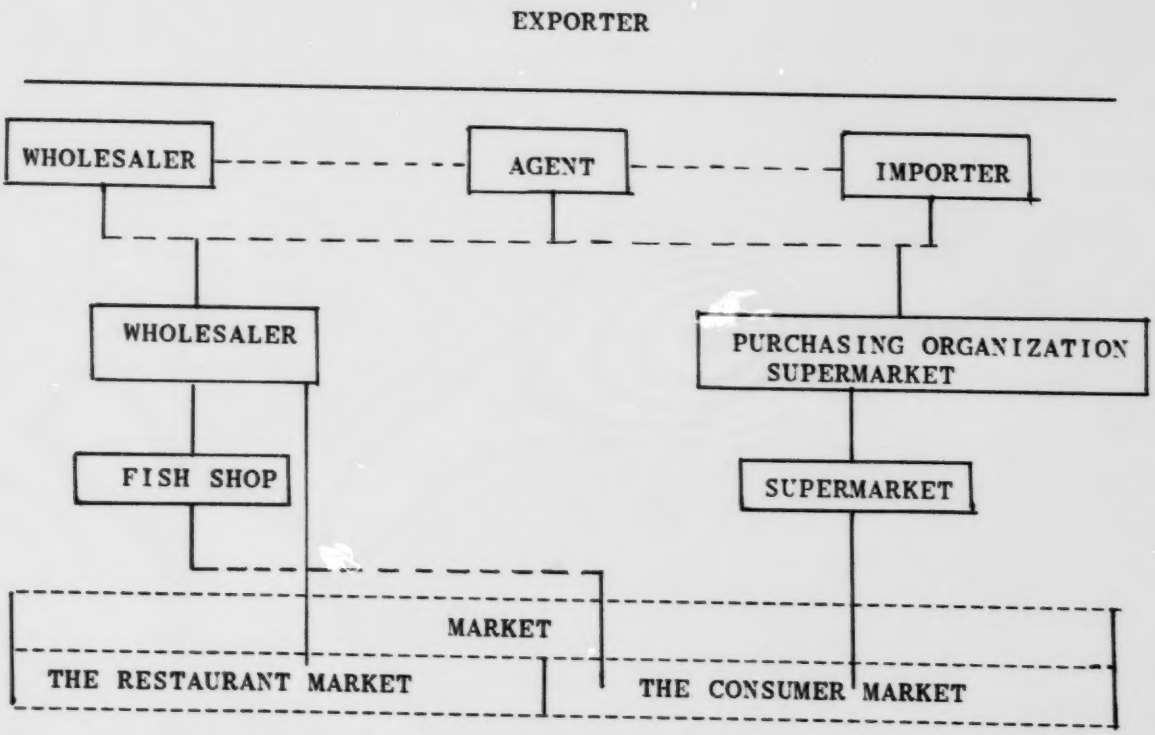


Figure 2. Distribution channels for fresh fish

There are three alternate entry points to the market (p.231) for an exporter: via importer, via agent or via wholesaler. Sales directly to purchasing organizations for supermarkets is not of interest in most markets without local representation for customs clearance. Representation abroad is a strategic decision that has different characteristics than the decision on the composition of a customer portfolio and will not be discussed here. The relative importance of the alternatives varies some from market to market. In the United States the agent network is quite extensive so that sales often go via an agent. In other markets (f.ex. France), the importers carry out most of the imports. In the further distribution there are also variations in the importance of the channels. In some countries the fish shops are the most important contact with the consumers. However, some countries have a supermarket link with well developed fish counters for the sale of fresh fish.

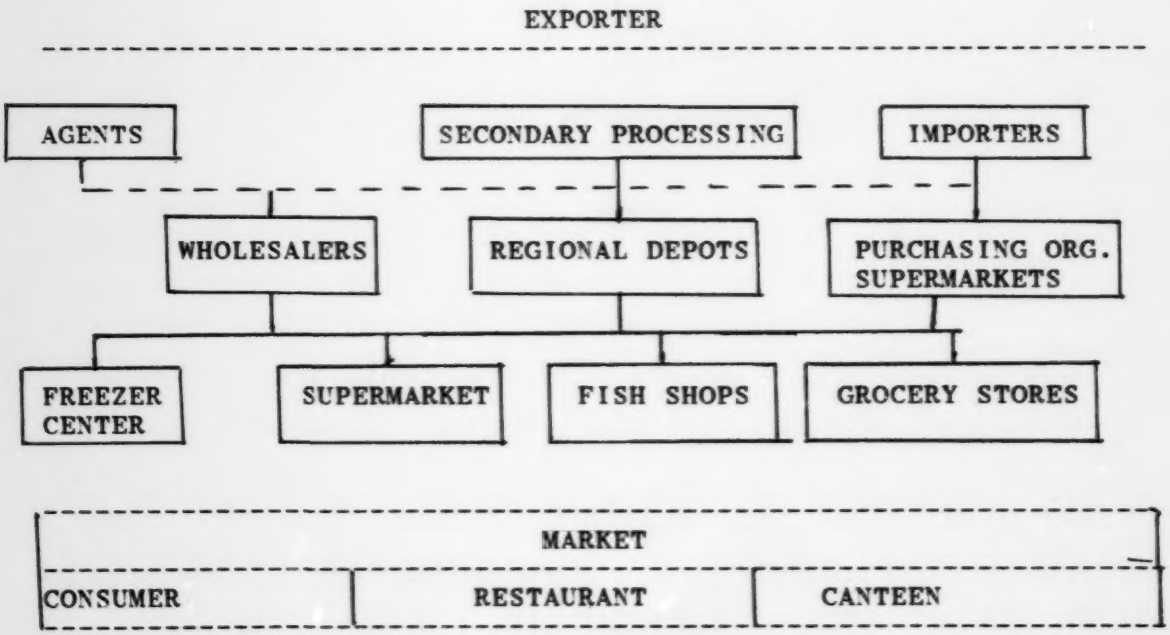


Figure 3. Distribution channels for frozen fish.

Figure 3 shows the distribution channels for frozen fish. Some of the sales in most countries are controlled by larger firms that have specialized on frozen foods. These often control the distribution links, wholesale links (see regional depots/sales offices in the figure) and also the transport function between wholesaler and retailer. In many cases these are integrated back to the harvesting link. This part of the sales takes place under each individual firms private labels that are supported by advertizing campaigns. (see Lines 1985b).

Agents and importers buy blocks or single frozen fillets for resale via the wholesale and retailer chains to the final consumer. The large frozen fish producers have the consumer market as their primary target group. Blocks and single frozen fillets go to a large degree to canteen- and restaurant markets. Furtehr processing between the segments varies from country to country.

The figure below shows the distribution channels for salmon for smoking/ smoked salmon.

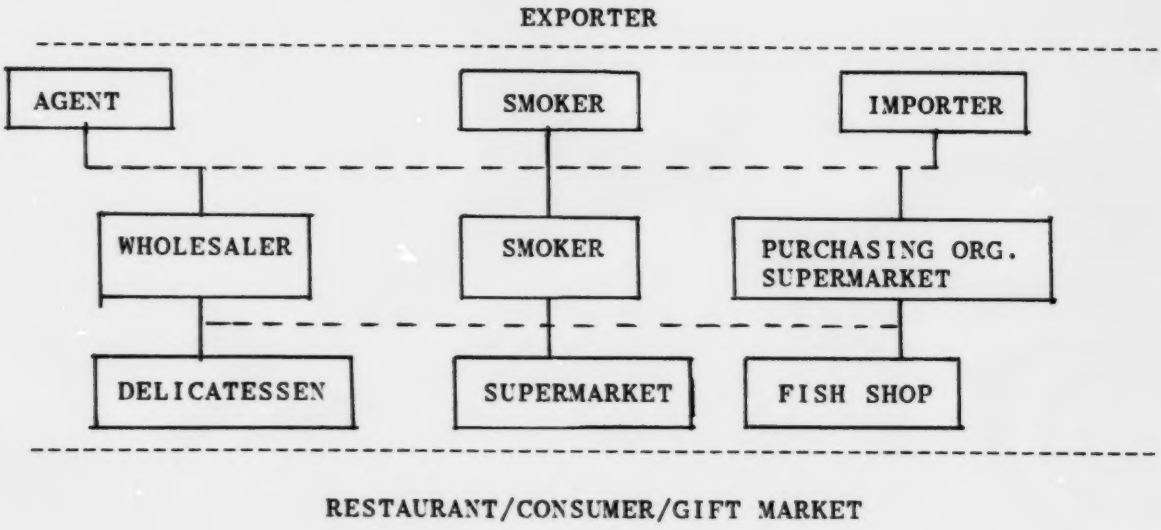


Figure 4. Distribution channels for smoked salmon and salmon for smoking.

As shown in Figure 4, a Norwegian exporter has three (p.233) entry gates to this market segment. The market is in each case the smokers (smoke houses, smoking firms), but the size of the individual smokers is the most important factor that determines if they import themselves or are supplied by agents or importers.

Before we analyze the decision situation faced by the exporters, we will describe some characteristics of the individual participants in each link of the distribution channels.

Importers are firms that have the import of fish (seafood) as their chief source of supply. Some of the imports is further processed in the firm, some sold to other processing firms and some sold through the retailer chain in the region where the firm is located. However, the most important customer group are the wholesalers. The importers differ to various degrees with respect to supplier conditions, product composition, geographical segment and segment in the end user market. The importers are involved in dividing up shipments, repacking, storage and re-shipping, to a certain degree with their own transportation equipment.

Agents have a similar function as the importers in that they re-sell to the same customer groups (wholesalers, secondary processing firms). The functional differences are mainly that the agents normally do not buy on their own account, but the shipments are invoiced directly to their customers. The work involved in credit evaluation and collection is then transferred from exporter to agent.

The secondary processors are firms that have secondary processing as their chief function. As a secondary activity these firms can enter the spot market occasionally for various fresh and frozen products based on the supply situation of their regular suppliers and price and quality levels. (p.234)
Classified according to finished products,this industry consists of canning firms, frozen fish firms, smokers and producers of various semi - preserved products (dried,salted, marinated). A

growing segment of this industrial market consists of firms for developing, processing and marketing minced fish based products (surimi etc.).

The wholesalers are firms that, by buying fish and shellfish from several more or less specialized suppliers domestically and abroad, assemble a product -, quality- and/or price spectrum that is adapted to the consumption pattern in the geographically limited area that the firm covers. Most of the sales are made to retailers and to the restaurant/canteen market.

The purchasing organizations for supermarket chains are organizations that purchase seafood on behalf of members in a supermarket chain. These organizations have to varying degrees access to central storages and transportation equipment to service member firms.

The participants down to the wholesale level are the most important within the framework of exporters strategy at the present time. The listing above is made to clarify the alternatives a Norwegian exporter has with respect to choice of link in the distribution channel, and the type of firms he can choose between. These are the two important choices in a distribution strategy as to structural and functional conditions in the channel, and the work distribution between the exporter and the intermediate links. In addition to this there are also a number of sources of heterogeneity between firms on the same level, and within the same category. For example, two wholesalers could be different as to size, product spectrum, geographical market coverage, coverage of a segment, willingness to pay etc.

Structural and functional conditions,and also conditions that differentiate individual firms,are the attributes a Norwegian exporting firm must obtain knowledge of to be able to carry out a rational assembly of the customer portfolio.

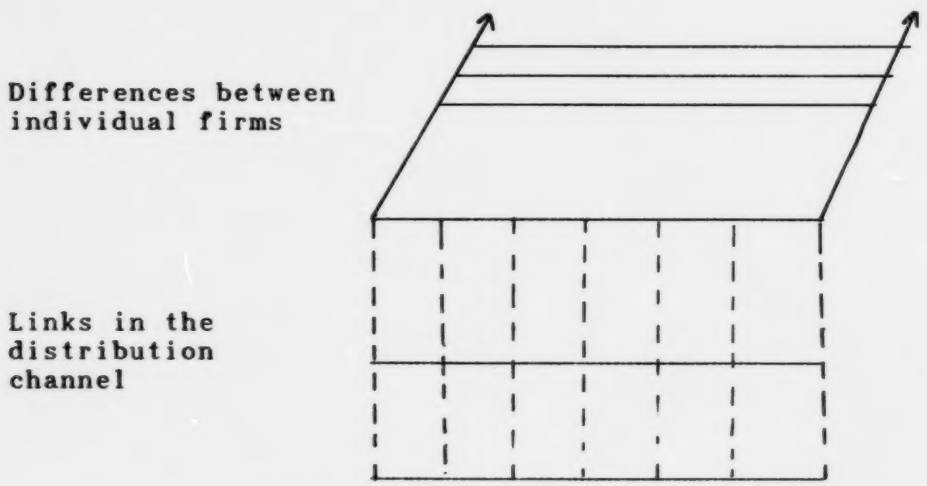
Information on these matters must in the next instance be compared with a set of criteria (a multi attribute preference function) that would have to build on the firm's marketing

strategy with respect to target groups, secondary processing between geographical segments, distribution of production between markets, risk profile, competitive profile and quality profile.

The last phase in the decision process itself will be the choice of a firm for further processing.

THE ATTRIBUTES

It was stated above that a Norwegian exporter's evaluation criteria are to be found in structural and functional conditions, and in features in individual firms that should be emphasized. There are therefore three dimensions where attributes of importance for the exporting firms can be found:



A matrix as shown above is therefore obtained for (p.236) the attributes the exporting firms will emphasize in the assembly of the customer portfolio.

With respect to the dimensions links and type of firm, the attributes become agent, importer, secondary processing plant,

wholesaler, purchasing organization for supermarkets.

The attributes around the internal conditions in a firm that gives rise to differences between companies within each square in the front of the matrix (link/type of firm; f.ex. wholesaler) are somewhat more complicated and based on conditions such as the firm's marketing strategy and risk profiles. In connection with information gathering they are also more difficult to handle because several are of qualitative character and must be operationalized.

Choice of distribution channel consists of many selections (see Stern and El - Ansary 1983) and many of these will be implicit. An important job for an information system will be to make sure that the selections, even if they are not optimal in the strictest sense, are made on as high a level of consciousness as possible.

The usefulness of this should be obvious. We have a suspicion that formal planning and evaluation of the distribution channels occurs to a very limited degree in the fishing industry. This in spite of the fact that much would be gained here with respect to growth potential, prices achieved, avoidance of losses on demands and harmony between supplier and distributor. An active use of the distribution channel as a strategic marketing instrument requires, however, a quite clearly formulated strategy for the firm. Absence of a clearly formulated strategy will contribute to a lack of clear goals against which to evaluate the various channel alternatives. In neglecting the distribution channel as an instrument, the seafood industry is in (p.237) good company. In a study of 18 American companies, Lambert (1978) found that in the majority of the cases, the firm's distribution channels were not the result of planning and evaluation, but they had simply developed over time. However, this is not an argument against trying to capitalize some of the gains inherent in a conscious assembly of the customer portfolio.

Below we will briefly present some criteria for choice of distribution channel. As pointed out above is there a close

connection between the exporter's marketing strategy and the criteria for choice.

1. Structural attributes in the choice of channel.

An important choice is between the distribution between agents and importers in the customer mass. Agents differ from importers in several areas. First they will normally not buy on their own account. The orders are invoiced directly to the agent's customers. For an exporter this means less control over which firms sales are made to. The exporters must to a large degree trust the agent's ability and will to make credit evaluations of the customer mass. Second, the experience has been that the agents are not "stayers" to the same degree that firms with stronger commitments through irreversible investment in the industry. This shows up in periods with market saturation. The agents the tend to be less active in price negotiations, and less willing to increase sales efforts to counteract the change in demand (one of the reasons for this is that the agent's profits to a larger degree is dependent on volume rather than price. In periods where these parameters are strongly inversely proportional, volume will be given priority.

Third, the agents will furthermore have less opportunity to test and promote new products and market combinations.

Secondary processing firms differ from agents and (p.238) importers in that they seem to place more weight on secure and stable supplies. A relatively high ratio of fixed costs requires steady activity, and contract sales (forward contracting) are more common in this segment. These firms are furthermore typical "stayers" and credit investigations are easier because the markets for the end products are more stable (see Lines 1985a).

The choice of entrance level in the distribution channel is between importer level and wholesaler level. Some firms have started to enter at the wholesale level. This will normally be a strategic choice that implies a shift in customer policies. By entering on the wholesale level, the firm is in a market that is

normally served by agents and importers. The combination importer / wholesaler is difficult because it requires a good overview over the market coverage of the importer contacts. Some sales to customer's customers have been reported (Falch-Olsen 1983) which contributes to damaging the customer relationship with the importer link. By entering on the wholesale level instead of the importer level, some of the functions that today are performed by the importers are taken on. These functions include order taking, dispatch and transportation arrangements, invoicing and credit evaluation. The number of contacts will increase because each wholesaler normally purchase smaller quantities, so that the extent of these operations will increase. The positive side is the opportunity to achieve a higher average price level. By entering on the wholesale level, one can also carry out more selective distribution aimed at certain segments of the market.

Sales of seafood through supermarkets increase in importance on most markets. These changes in distribution form has resulted in a new type of participants establishing themselves in the distribution of seafood:

Purchasing centrals for supermarkets. Most supermarkets are organized in chains, and some joint functions are (p.239) performed centrally, among these is purchasing. The purchasing centrals perform the wholesale function for the supermarkets in the chain, but have some qualitative characteristics that differ from the traditional wholesaler link. First, as part of a very large concern they have a good credit rating. The problems with credit investigations, follow ups and collection are eliminated when selling to a supermarket. It would further mean dealing with large customers with set plans for sales. This opens opportunities for production planning for the exporter and low sales expenses. Sales to supermarkets will in most markets also mean sales into a growth segment.

On the other side, the exporter will have a professional purchasing organization as negotiating counterpart with the demands this place on delivery guarantees, prices, quality and

product spectrum.

The sale to supermarket chains will further normally require control over a certain infrastructure in the market. It will require that entry through customs is done by the exporter, and transportation to the central warehouse must be secured.

Another new participant in the market is the freezer centers. These are organized in chains similar to supermarkets and have joint purchasing functions. In some cases they are integrated backwards with secondary processing and packaging facilities.

2. Attributes of individual firms within a category.

Also within one category of firms will there be differences of importance for the composition of a customer portfolio. Individual firms, either supermarket chains, processors, wholesalers or importers will have different solidity, geographical coverage, coverage of segment, growth potential, quality profile, price profile etc. Below we will briefly (p.240) go through some attributes of individual firms that will be evaluated by an exporter.

Geographical coverage will have an influence on the market situation for an exporting firm in several ways. Most firms that participate in the distribution of seafood have a certain amount of specialization with respect to which regions they cover. This applies especially to the wholesaler link, which by definition cover a geographically delineated market.

First, there will in most countries be regional differences in the composition of the diet. This means differences in sales opportunities for species and seafood products. Consumption of the various products is rooted in eating habits, and these are in many cases determined by cultural differences between regions. Second, there will be regional differences in purchasing power. There are large regional differences in the economic conditions in each country. One can often find regions with a one sided industry strongly dependent on business conditions. Changes in

economic conditions for this industry will then affect the demand for all products, also seafood. The effect on demand will be dependent of the product; the salmon market will be affected differently than the market for pollock. There will furthermore be regional differences in the level for competition. Not all regions are covered equally well by the channels Norwegian products are marketed through. Finally, as mentioned it will be of importance to know the geographic coverage in mixed entry to the market, i.e. when sales are made both to importer and wholesaler as the first link.

Difference in coverage of segment. Most markets for seafood could be divided into segments with different functional characteristics. Three principal segments are the restaurant, canteen and consumer segments (see Fig.1). The segments
(p.241)
differ in willingness to pay, quality requirements, consumption mix and demand dynamics throughout the year. Most firms in the distribution of seafood has a specialization with respect to these segments. Exporting firms have opportunities to tie these functional differences to their own plans and projections, for example with respect to raw material base and to the marketing strategy in general. Within these segments there can be several sub segments.

Differences in quality profile and growth potential will to a large extent be tied to which segments that are being serviced.

The product mix in the distributors merchandise selection will contribute to determine sales volume of the different products on the market in question.

The size of the firm will also have some effect at the same time as the size will be decisive for the cooperative climate between importer and exporter through the importance each of the partners have on each others activity, and the relative bargaining power (see Porter 1980).

Solidity is an attribute that has great importance within the distribution of seafood (see also Lines 1986b).

OPERATIONALIZATION OF THE ATTRIBUTES

The attributes we discussed above has basis in the firm's need for information on the distribution channels A problem occurs when information is to be disseminated on these attributes; they are to a large extent qualitative and the inflow of information is limited. We must therefore attempt to operationalize them to measurable sizes that it would be possible to obtain information on.

Some of the attributes have been operationalized earlier (Lines op.cit.). Geographic coverage is a quantity that strictly speaking should express the distribution of sales in more specified geographic areas. These are internal corporate data that would not be directly available for external participants. Other types of information on geographical coverage would be statements, interviews and advertisements. For wholesalers, the address of the firm will give information on the geographic coverage. For importers, agents and secondary processors, the address is not always indicative of the geographic coverage of the market. The location of these firms will often be raw material oriented. The agents are relatively flexible and need not be in a specific location relative to the markets they serve, or relative to raw material supplies.

Information on which market segment the firms focus on would have to be solicited from statements made by the firms own people in the press and from information in advertisements.

The size of the attributes and product composition are closely related seen from an exporters point of view. The size of the firm is in itself of interest (see above), but just as important is size with respect to the products that are to be sold through the channel. Information on size is given by the value for total sales available from credit bureaus. Information on size for the individual products is not registered in external accounts and must therefore be based on qualitative knowledge of the firm. Product selection is more or less available through

advertisements. By coupling annual sales to the information from advertisements, a relatively good picture of size can be obtained, also divided on individual products.

The growth potential of a firm is tied to both external and internal conditions. The external conditions will be tied (p.243) to long term processes of change that lead to structural changes in the distribution channels. The increasing importance of supermarkets in the distribution of seafood is an example of this. There is some experimentation on new forms of distribution, and the industry is in constant change in this respect. The type of firm therefore contributes to determining the growth potential. The other external factor is changes in consumption that applies to the market in general, independently of the distribution form.

Of internal factors, the quality of the management and management goals with respect to growth, will be decisive for the growth potential. The growth potential could also be evaluated from which segment of the market is being covered. The growth

potential is therefore determined from a total evaluation of the other attributes. The growth potential is an important factor for products where a large increase in production is expected (for example salmon).

AN OVERALL MODEL FOR INFORMATION REQUIREMENTS

The need for information for assembling a customer portfolio on a market is therefore tied to attributes in three areas:

- The type of firm
- Links in the distribution channel
- Differences between individual firms

1. The type of firm.

Within this category the exporters have the following alternatives:

Importer (p.244)
Secondary processor
Agent

Wholesaler
Purchasing center for supermarkets
Purchasing center for freezer centers

2. Links in the distribution channel

Here the exporters have two alternatives:

Firms that principally serve wholesalers (f.ex.importers)
Firms that principally serve the retail level

3. Attributes of individual firms

Exporters will here be able to choose between firms that differ in the following:

Geographical coverage
Coverage of segment
Quality profile
Growth potential
Product mix
Size
Solidity

The information in a decision system will be organized around these factors with a module and database for each market.

MODELLING SEAFOOD MARKETS

CONTENTS

PAGE

1. INTRODUCTION..... 238

2. TWO PRINCIPAL MODEL FORMS..... 239

3. SOME EMPIRICAL MODELS FOR SEAFOOD MARKETS..... 242

4. USE OF MARKETING MODELS IN CONNECTION WITH SYSTEMS 246

INTRODUCTION (p.247)

An information system can consist of a database part and a model base. In such systems , analogies to a production process can be drawn, where the entry of data is the supplying of fuel, the data is the fuel and the model the motor that drives the system. Use of models in connection with the processing of data will, however, assume that certain conditions are met. First, models must be developed that are reliable and good that they are suitable for solving a practical problem. Good models are not by far available in all areas. There are some models developed to describe some general market phenomenon or to support the decision maker in some important areas in marketing. These models have been reported to be principle models (factors and relations between some key factors are specified) and estimation of parameters, stability in parameters and identification of industry specific or company specific parameters is development work left to the user of the model. There is therefore no already developed tools that can be purchased and taken in use with a reasonable degree of adaptation as the case is other activity areas such as accounting. This is the one consideration to bear in mind when evaluating the potential for model use in the development of a decision support system for marketing related decisions.

The other consideration is the marketing activities as they are actually performed in the fishing industry today. The models that are developed and that are reported in textbooks and publications are in most cases oriented towards marketing activities on a relatively professional level (product design and development, tactical and strategic pricing of non-commodity products, distribution decisions, advertising decisions etc. (Lilien and Kotler, 1983). Utilization and usefulness of the models therefore presupposes a professional marketing (p.248) organization that actively utilizes the tools within the trade or activity area marketing.

In this paper we will search the literature to find in which

areas have models have been developed for marketing activities, and attempt to give an assessment if it would be optimal to direct the effort towards model development for a decision support system for marketing of seafood products.

TWO PRINCIPAL FORMS OF THE MODEL

In the literature (f.ex. Evrard and LeMaire 1976), models are characterized as normative or descriptive according to if they are meant to describe a phenomenon (f.ex. price formation) or if they have as their goal to give the best solution to a problem (normative).

The models that are launched in the area of marketing, can also be classified according to the phenomenon they are to describe, or which functional areas within marketing they are to cover. As an example of the last, there are models that are to describe and explain consumer behavior, price formation, support part decisions within advertising and distribution and the launching of new products.

In this paper we will concentrate on the first type of models, i.e. models that are to explain (or predicate) prices and volume traded of a given product on a given market.

There has been some research done in the field of modelling of markets for seafood products, and in the literature (p.249) several models that have been formulated and estimated econometrically have been published. The models have their basis in neo-classical theories for demand and supply; an implicit presumption is therefore that the products are to be considered as non-differentiated raw materials where the price clear a quantity in the markets at any time. This is a relatively rough description of market conditions, but in the short term and on a macro level it appears that in many cases most of the price variations ($R2 > 90\%$) can be explained with the help of relatively simple models for demand and supply. The models demand a high degree of stability in factors that are exogenous, but that affect the demand. One of the presumptions is therefore that

they apply in periods without exogenous shocks, for example as a result of new trade policies, legislative changes, the development of new products, changes in income distribution, a war or massive migrations of people. Any model is a simplification of the real causal connections, mainly because only some (the most important) factors that affects demand are considered. Also, the relationship between the explaining variables and the dependent variable is represented by a mathematical function (usually linear or log linear), while the real relations are more complex. If the models are to have power of explanation, they must not oversimplify actual conditions, more specifically by leaving out important relationships or postulate the connection in a faulty manner. Another problem in modelling is the supply of relevant data and the operationalization of the factors included in the model (f.ex. how is flavor and changes in flavor measured).

The models have been developed for the price formation on the import level (first hand) or on the wholesale level. Most have been time series analyses of historical data, and have as such limited value for prognosis because the factors that go into the models often are just as difficult to predict as the dependent variable (price or quantity). We therefore (p.250) consider it to be difficult to use the models for explicit solutions of a value for the price. The models can still be utilized on a more qualitative basis in a system connection. The models have value on two levels. First they postulate and test the factors that affect price formation. Second, they give a certain information on to what degree prices react on changes in quantities offered (price flexibility). This is important information for evaluating the effects of fluctuations in supply.

We can therefore see a potential value in the models or modified versions of the models, possible for use in sensitivity analyses of the markets. An approach of the type: What will happen to prices on a given market if Norwegian exports to the market increase by 30% , could be illustrated with the help of

the historic knowledge on market dynamics that is included in the models.

The literature on decision support systems discusses the modelling problems very skimpily and on a very general level. The planning is that the models that are to be included in the systems are developed especially with one user in mind. We have seen the decision process modelled and also certain rules that are include in the decision process (for evaluation of alternatives and choices). An example of this is BRANDAID (see Lines 1986), which is a decision support system for choice of means for use in marketing. Included in this system is the marketing manager's experience and judgement of the relationship between the various means and sales. These are combined to give the optimum composition. The response function for the marketing mix is established on an intuitive basis, and with the help of the theory for its general appearance (asymptotic rising), and is really not the result of any special formal analysis. This can be a correct (or necessary) procedure in a market for very differentiated products. For non - differentiated products, like most seafood products, the actions of individual (p.251) exporters will in itself have little effect on the market. It is the aggregated variation in supply and demand that gives rise to changing marketing opportunities. The connection is complex, and the modelling itself of the markets become an important job. Use of the models, and of the information from the models,also becomes fundamentally different. It is not possible to analyze the effects of their own actions, but rather to analyze basic conditions and changes in these that individual firms are affected by and must consider in the long and short term.

In this paper we will first present some of the models that have been reported. Next we will do an evaluation of if or how these models could be used in a marketing information system or a decision support system for marketing decisions.

SOME EMPIRICAL MODELS FOR SEAFOOD MARKETS

The simplest models in use for modelling markets are so called one -equation models (f.ex. Kotsoyannis 1981). This type of models can be used in cases where the supply can be considered to be exogenous, it is independent of the market price at any time. The supply of fish is to a large extent determined by biological and meteorological factors outside the control of the market participants. Variations in supply can thereby be considered to be exogenous and not as a quantity adaptation to fluctuating market prices.

If this assumption (exogenous supply) does not hold, there is a simultaneous problem, and other techniques must be used to estimate the dependent variable. In our estimation, however, in many cases it could be argued for considering supply (p.252) as being exogenous. By using simultaneous formulation of the models, a rather artificial and uncertain modelling of the supply is achieved (see Lines 1985). Storey and Willis (1978) formulated a model for the supply based on known biological relationships, but found by testing it that the model did not give a satisfactory descriptions of the variations in the supply of scallops. The same experience was made by others, like Altobello (1977) and Doll (1972) for shrimp.

The basic model used is therefore a model directly formulated from neo - classical micro theory with the following implicit form:

$$Q = f(P, P_1, Y, T),$$

where Q = Demand quantity

P = Price of product

P_1 = Price of other products

Y = Income

T = Taste

The hypothesis implicit in this model is therefore that the demand for a certain product is dependent of the price of the product itself, the price of other products, the income of the buyers and the taste of the buyers. The other factors that are

left out, are represented by a stochastic residual link which is a characteristic of the use of econometric models.

For estimation of the model, i.e. quantification of the relationships between demand and the descriptive variables, a mathematical form (explicit form) of the model is specified. Two principal forms are common : linear and log linear forms. The model will then take on the following general appearance;

Linear: $Q = b_0 + b_1 P + b_2 P_0 + b_3 Y + b_4 t + u$,

where u = is the residual link.

Log linear: $Q = b_0 + b_1 \ln P + b_2 \ln P_0 = b_3 \ln Y + b_4 \ln t + u$

The coefficients and the residual links are different in the two models.

We will already here point out some simplifications that are built into the model with the form it has here. One simplification will be in the expression for "other products". The rational for including this link is that the demand for a given product depends on the price of substituting products. This seems intuitively to be correct and is also so in most cases in practice (it must be noted that in some studies it has not been possible to show any significant relationship between demand and the price of substitutes). However, the problem will be to identify and limit which substitutes are to be included in the model. Questions can be asked, such as : Is the demand for fresh cod dependent on the price for cod fillets, for pollock and other groundfish species, or is it dependent on the price for all fish species? Also, does the price depend on the price for all forms of animal proteins, or is it dependent only on the price of some species and some types of meat? Intuitively it could be assumed that this is determined by the diet in each individual market. But there is also substitution in the distribution, not only in the consumption. Substitution by importers, wholesalers and retailers will not occur from the same criteria as those used by the consumer. It must furthermore be assumed that the time factor contributes to the substitutability of the individual products.

Diets are altered over time after continuing changes in the relative prices and according to the availability in the market. Our point is to point out how complex the demand for seafood is, and that identification of important substitutes requires market knowledge. The methodology is to carry out qualified choices of substitutes, and then test the connection empirically (f.ex. by step-wise regression, cluster analysis etc.).

The other simplification is in the category "taste". This link is also very complicated. We will only mention that the effect of all means within marketing except product development (i.e. distribution, price and communication) will be registered as changes in taste (preferences). Second, taste is just about impossible to operationalize. As the second best solution, the econometricians have therefore included a time factor in the models to compensate for changes in taste over time.

In spite of these problems, the models have in many cases been able to explain the main part of the demand variations.

Before we proceed to present some empirical model, we will mention one condition that is specific for the fishing industry (and the agricultural industry) in the formulation of marketing models. The industry is to a high degree governed by the supply. In other industries, the quantities sold the result of the supplier's profit maximization and the buyer's maximization of use. In the fishing (seafood) industry the supply is exogenous and given. It is the price that clears a fluctuating supply and which is the dependent variable. The result is so called price dependent models.

Another important point is that the microeconomic model is to be considered as a starting point that can be adapted to markets to be modelled. Other factors can be of importance, either because they also affect the price formation , or as representatives of these factors in cases where a compromise must be made between the definition of the variable and the inflow of data (as in the case of taste). A new factor in relation to the basic model which is often included is storage holdings. Storage

buildup results in weakening in demand until quantities in storage have been reduced to a normal level. Another factor is the time of the year which has an important effect on the demand for a number of products. It is common practice to correct for shifts in the demand by the use of dummy variables (dichotome variables).

In the rest of this section we will briefly present two empirical models that have been published. For other models, we refer to the literature references at the end of the section. Young (1977) studied the demand and price formation for some fish species on the British market with the help of econometric models. Among the goals of the investigation was to map out and quantify the relationship between the demand for different species and different types of meat. Furthermore, he would identify and evaluate the factors that affected the general price levels, and the connection between fish prices and meat prices on the wholesale level.

A number of models were specified and tested. All the models had the same general form where the demand was assumed to be determined by the price of the product, the price of other specified fish products, and of further specified meat prices, the income level, and the quarter of the year that was studied. Two principal types of models were tested, a price dependent and a quantity dependent model.

The evaluation of the models gave mixed results. The power of explanation (expressed by R^2) varied from >90% down to <20% of respectively the price and quantity variations. Similar variations were found for the level of significance for the parameters (t-values) and for the model overall (F-values). The conclusion is that for some fish species price formation or demand can be represented by a simple econometric model of this type.

In another study, Storey and Willis (1978) analyzed (p.256) the demand for scallops on the American market. The model used was a modified microeconomic model which included an expression

for storage, and two expressions for imports were explicit in addition to own landings. The demand (expressed by price formation), was estimated at three levels in the distribution channels : from the fishermen, on the wholesale level and on the retail level. The models had a high power of explanation (R_2 = 99%). In this article there is also a sensitivity analysis presented where the effects of price on the variations in the landings are studied more closely.

The empirical findings are not interesting in this connection, the point is to show that relatively simple econometric models in certain cases give a good description of the price formation for a product and market combination.

USE OF MARKETING MODELS IN CONNECTION WITH SYSTEMS

In this sector we will further discuss the potential use of microeconomic marketing models for participants in the seafood industry. Inclusion of models in an information system is not a measure in itself. The assumption for this to be desirable is that the models improve the decisions to be taken through an improvement of the information value. We believe that it is useful in the first instance to draw comparisons with the function that a model is supposed to replace. Models of the type presented here have as function to analyze the effects on the price formation by changes to one or more of the factors included as an explanation variable in the model.

Alternative procedures would be to evaluate the effects of changes on an intuitive basis from one's own more or less extensive experience on the relationships between the (p.257) explanation variables and the price. As an example , an exporter can have information that the cod catch in Iceland, the Faroe Islands and Canada probably will increase by 20% next year. The exporter also has information that these countries in the past years have exported 50% of their landings to the USA. The United States is also the primary market for Norwegian cod fillets. The exporter's problem is to estimate the effects of these increased

landings on the estimated price level for the next year. The price level is in turn decisive for decision on product choices by the exporter and his suppliers. An intuitive estimate of this would probably be very uncertain. The cause and effect connections are complex enough that the exporter can not be expected to be able to undertake the "correct" balancing. Included in a good model are historical data for the connection between quantities sold and price. Based implicitly on historical data, the effects on prices can therefore be estimated if there is good information on the variables included in the model. We feel that it is probable that the calculated effect will be closer to the factual price than the result of qualified guessing.

At the same time is there a responsibility in encouraging the use of such models. The models must either be very stable or the uncertainty in the models must be thoroughly explained to the user. In many cases the uncertainty can not be eliminated.

As mentioned, we can see a potential in the use of the models to simulate the effects of changes in supplies to individual markets. In most cases that we have seen, the supply has been the principal reason for the price variations. This will also probably be the factor that it is easiest to obtain information on through stock- and harvesting projections. The other factors, the prices of substitutes and quantities in storage, will not be available to the same extent. The resource projections have a relatively high element of uncertainty, but the level of precision does not have to be as high. By (p.258) the use of models and estimates of the variables, there can be a reduction in uncertainty. Exact values for the price level could not be achieved under all circumstances.

Knowledgeable about the difficulties of developing good models for the price formation, we will direct a limited effort towards formulating and testing some aggregated models like this for some fish species because we can see a potential use for such models.

CLOSING

In the preceding report and in the following notes, we feel that we have discussed the most important problem areas encountered in developing EDP - based systems for market information for the seafood industry. The user basis has been taken up, both qualitatively with respect to which information is requested, and quantitatively with respect to how large the "customer basis" would be for an external system. The supply of data has been discussed, and attempts have been made to map out qualitatively and quantitatively the sources the information systems can use information from. We have also studied and evaluated some methods for surveying information needs, for organizing the information and designing the systems. Use of models for increasing the information value of the database has been discussed.

In this last chapter we will attempt to draw the most important conclusions from the work so far, and to outline fields where further efforts in this area should be concentrated.

CONCLUSIONS

One of the main conclusions from this introductory work with marketing information systems is that development and establishment of EDP - based information systems is high risk. The literature reports on numerous examples where large resources has been used for development and implementation of information systems that in turn have not met expectations and therefore rejected by the intended users. In a symposium for on-line information systems that was held recently, one of the speakers summarized the experiences of this industry after ca. 15 years of development and operation of multi-use EDP - based information systems. The conclusion of the talk was that few of the 2500 databases in use today are operated with profits for the (p.260) owners. There appears to be no doubt that the risk is high for

For information only

developing systems that do not meet the requirements for usefulness by the users. There are currently two EDP - based information systems for the fishing (seafood) industry available, and these also appear to have received a relatively cool reception from the users.

In spite of these discouraging experiences, there are examples of systems that have been successful. It also appears that the risk of developing systems without value for the users can be reduced by carrying out a thorough survey of the information needs of the users before the decision is made to develop the systems. The risk can be further reduced by acknowledging that development of information systems is a process where one should not have a total perspective of the user's information requirements.The system should rather be developed bit by bit , f.inst. because an EDP - based information system does not have comparative advantages over alternative information sources for all sources of information.

This also means that there must be willingness to accept a conclusion that information technology is not suited as a medium for marketing information for the fishing industry, or only for very limited sectors of the firm's total information requirements.

These conclusions apply to information technology as a medium for information storage, -processing and -dissemination. In the work so far one of the assumptions has been that the marketing information system should be EDP - based.

Another problem area is the need for marketing information, and the user's ability to utilize more and other information. The preliminary study shows that the seafood industry clearly feels a need for , and has a desire for, better access to market information. This demand gives us a good incitement to (p.261) continue the work. The need is both for short-term information and information of more long-term character for strategic use. This increases the opportunities to develop systems that can meet some of the information needs. One of the limitations with

respect to which information to be disseminated is found in the firm manager's knowledge base in the technical areas of marketing and strategy, and the capacity of management to go through and process large quantities of information. The perceived information needs are based on which models management have of the markets and which conditions are relevant in evaluating market conditions. The less understanding there is for the complexity of what affects f.inst. the price formation in the long term, the less information will there be a need for. One of the largest potentials in the use of EDP - based information systems is just that they through structuring and dissemination of certain types of information "urge" the user to use more nuanced marketing models and thereby leads to better decisions.

The last of the important basic conditions for successful development of a system for information on markets for fish and fish products, are in the knowledge of market conditions, and sources of information with respect to conditions that are relevant to decisions in relation to markets. The bit of knowledge must probably be subject to a gradual upgrading. Already today research environments and the industry itself have a basic knowledge on which conditions are relevant to monitor and to obtain information on. This basic knowledge can form the basis for the organization of information in a system. Both here in Norway and internationally there is a continuous development of this knowledge base through fisheries research, and also through research in the relevant areas of economics, marketing and management decision making. We can therefore see that the information structure within the individual parts of a (p.262) system will be subject to continuous development as new knowledge is being generated.

As mentioned in several places in this report, a market information system must be coupled to a market monitoring system.We have used as basis that a system must be built up and operated from publicly available sources for secondary data. This self imposed condition sets clear limits for which areas within

the decision makers total information needs a system can take aim at covering. If this condition is lifted, f.ex. if a decision is made to build up an international organization consisting of informants in the most important markets, new fields open up also for the information system. A decision like this would in our opinion be a natural consequence of the industries' desire for better market orientation and better access to marketing information.

If we keep two important conditions, i.e. that the system should be EDP - based and the system should be operated with basis in sources that today are freely available, our conclusion is that a system must be developed piece by piece where each piece takes aim at covering areas where there is a documented and specified need for information , an also that it is established that an EDP - based system can cover the information needs better than the information system the firms are using today.

GUIDELINES FOR FURTHER WORK

The main objectives of the preliminary study has been more or less explicitly to study to what degree information technology can contribute to improving the access to marketing information by the fishing industry. We suggest that this objective be redefined in the future to apply to solutions for (p.263) improving the supply of marketing information for the fishing industry, and that the further work with information technology as medium and analytical tool becomes a sub objective of the project. This change in priorities does not mean that the work with EDP - based information systems is dropped, but that in addition other media for information and other forms for dissemination are open for evaluation. The reason that we suggest this is that the assumption that the information systems are to be EDP - based acts as a straightjacket relative to some forms

for information. For example, EDP - based systems are not suitable for dissemination of more extensive market analyses. We do not find it natural to eliminate this type of information due to limitations of the medium. Such analyses are requested by the user group, and at the same time an external organization would be better able to supply, perform or disseminate such analyses than the users themselves.

Much of the research and development work that must be performed in advance of any establishment of an external information system would be common for EDP - based or other system forms.As a result of this, after studying the information needs, sources of information and market models, a decision can be made as to what types of information would be suitable for electronic entry, processing,, storage and dissemination, and for what information other, more manual forms would be more suitable. There could also be an interplay between two parts of the system where the EDP - based part gives cross references to a file for reports, or to organizations outside the system.

The work with the preliminary projects has identified three areas that require further studies before a system could be established.

Each of the Norwegian seafood products are sold in markets where selling conditions and price formation is affected by a set of factors. The factors can be divided roughly into two groups: Factors that determine supply and factors that determine demand. The supply is determined by factors like the resource situation, quota recommendations, quotas, availability, product structure, export structure and harvesting effort. The total demand is determined by preferences, buying power, substitution offers (marketing mix for substitutes). A further study of these factors, and background factors for these, will be necessary as a survey of which factors that must be monitored, and that a marketing information system shall disseminate information on. The goal is to study relationships between cause and effect (establish market models) that are to be built into the system in

the next round. The analytical basis for this part would be marketing theory on the buying behavior of consumers and companies, and neo-classical micro theory on supply and demand. The empirical information will be collected from available market reports for fish and fish products , and from interviews with people in the trade. A survey of important substitutes requires a longer market horizon, and will require limited field investigations (interviews with key personnel in the markets).

The preliminary projects further uncovered a demand for carrying out a more systematic survey of what decisions should be supported by the marketing information. Information has no value if it neither increases the effectiveness nor the efficiency of the decisions being taken. It would be necessary to determine ; 1) What decisions should be given priority in assembling the system , and 2) How is the decision making behavior. The method has as goals to identify the individual parts of the decisions, determine information need at each level (normative modelling), and perhaps carry out a modelling of a qualitatively better decision making process (normative modelling), and build up a decision support system either relative to the (p.265) descriptive or the normative model for the decision process. The work to survey decisions and decision making processes was barely started in the preliminary study, and the intention is to continue this process through interviews and questionnaires and participating observation, and a literature search. The normative modelling can, as we see it, be an important part of this work. The knowledge of market conditions and modern marketing in the fishing industry is sufficiently limited that we by normative modelling can build in, and transfer some of the principles from marketing directly to relate to decisions taken by the firms.

A further analysis of what is available as sources for market information and an integration of market modelling, decision analysis and information sources will conclude the analytical work. In the preliminary phase we have surveyed the most important sources that are available. The next phase will be

an analytical study of these sources to determine how they collectively can give information on the factors that were identified through the modelling of the marketing - and decision making analysis.

The last phase in the project will be to outline a system to disseminate this information. This work will mainly consist of finding suitable forms of presentation (text, graphical depiction, tables, organizing the information in interface).

Use and cost evaluations have not been carried out explicitly in the preliminary project work. The reason for this is that both the use and the costs would be tied to the formulation of the system, and we have today not enough knowledge to give a final outline of this. From the literature we know that the development of MIS/DSS is resource-demanding and takes time. This will also be the case for a marketing information system for the fishing industry. The project has already given us ideas for how (p.266) a system <u>can</u> be formulated. These ideas will be firmed up and be further developed in the project phase. The decision to establish a system will be political-commercial. If the project does not result in the establishment of a system like this immediately, it would still generate important information on marketing conditions for the fishing industry, information needs, sources of information and decision making in the fishing industry. This is knowledge that can be used both by the private and public sectors and also by the fisheries research environments in other connections.

In other countries (f.ex. USA and France) we have seen that governmental involvement in the area of marketing information has resulted in the establishment of organizations for the monitoring of markets, preparation of projections and market analyses on a continuing basis and for <u>ad hoc</u> concentrated assignments. Development and operation of EDP - based information systems is an activity within a larger whole. This <u>could</u> be a suitable model also for the Norwegian fishing industry. If a solution like that is chosen, much of the knowledge and information that is

generated through this project would be relevant to the development of a comparable organization.

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